THE MARINE REVIEW

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Turbines for Cargo Ships

ANNOUNCEMENT was made in THE MARINE REVIEW for December of the decision of the Parsons Marine Steam Turbine Co., Newcastle, England, to carry out exhaustive experiments in the application of turbines to cargo ships and of the purchase of the steamer Vespasian for the purpose. Particulars are just to hand in a paper presented by Chas. A. Parsons, of the Parsons Marine Steam Turbine Co., at the session of the Institution of Naval Architects, March 18, of the results of the experiments.

The Vespasian was built in 1887 at Sunderland and is of the following dimensions:

Length on load water line	275 ft.
Beam, molded	38 ft. 9 in.
Depth, molded	21 ft. 2 in.
Mean light draught	19 ft. 8 in.
Displacement	4,350 tons.
Block coefficient	0.754

The vessel was fitted with an ordinary triple-expansion surface-condensing engine with cylinders 22¼ in., 35-in. and 59-in. diameter, 42-in. stroke. The air, circulating, feed and bilge pumps were driven from the intermediate-pressure crosshead, with the usual arrangement of levers and links. The condenser was cast with the back columns of the main engine, and had a cooling surface of 1,770 sq. ft. The boilers—two in number—are 13 ft. diameter by 10 ft. 6 in. long, with a total heating surface of 3,430 sq. ft., and grate area of 98 sq. ft., working under a pressure of 150 lbs. with natural draft. The propeller is of cast iron, four bladed, having a diameter of 14 ft., pitch 16.35 ft., and expanded area of 70 sq. ft.

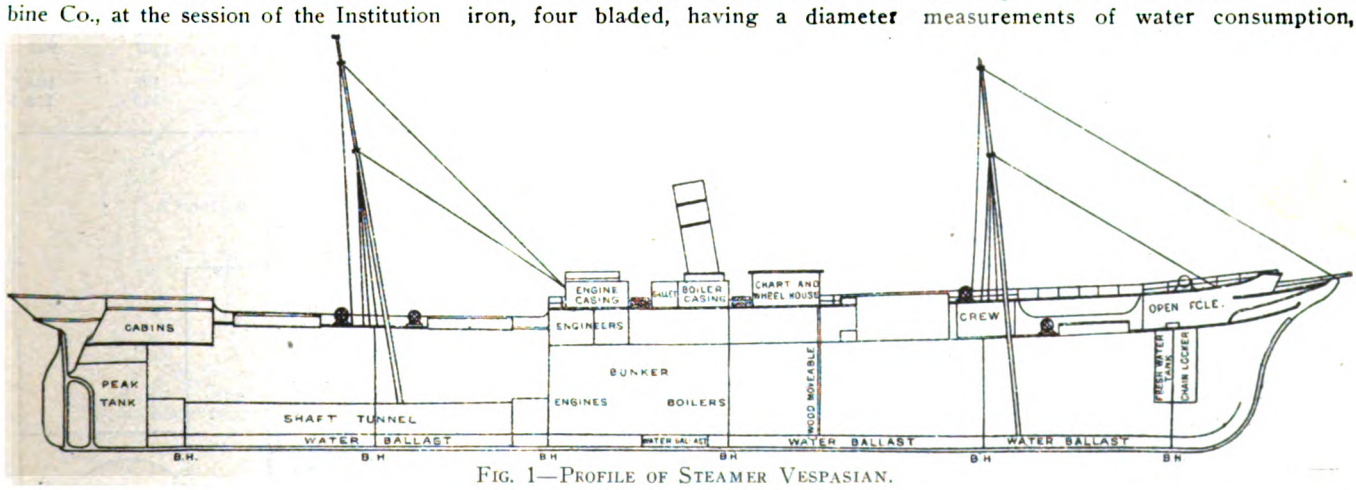


FIG. 1—PROFILE OF STEAMER VESPASIAN.

With a view to obtaining comparative data between the turbine installation and the reciprocating engine, it was decided to run trials with the vessel with her reciprocating engine previous to its removal and the installing of turbines and gearing.

Fig. 1 shows a profile of the vessel, and Figs. 2, 3. 4 and 5 the general arrangement of the reciprocating engine and boilers.

Before proceeding on the voyage upon which data regarding the performance of the reciprocating engine were taken, the propelling machinery was completely dismantled and overhauled. The high-pressure piston valve chamber was rebored and new valve rings fitted; slide valves were replaned and faced up; bearings were renewed, and other repairs carried out wherever necessary to bring the machinery into an efficient condition and first-class working order. To obtain reliable measurements of water consumption, two tanks were fitted, each of 400 gallons capacity, with suitable change cocks and connections for the air pump to discharge through these measuring tanks.

It was necessary, for the purpose of obtaining data under service conditions, that the vessel should be run at her loaded condition. Arrangements were consequently made to take a cargo of coal from Tyne to Malta, and on June 26, last year, the Vespasian left the Tyne in a loaded condition with a special recording staff on board, and on this voyage careful measure

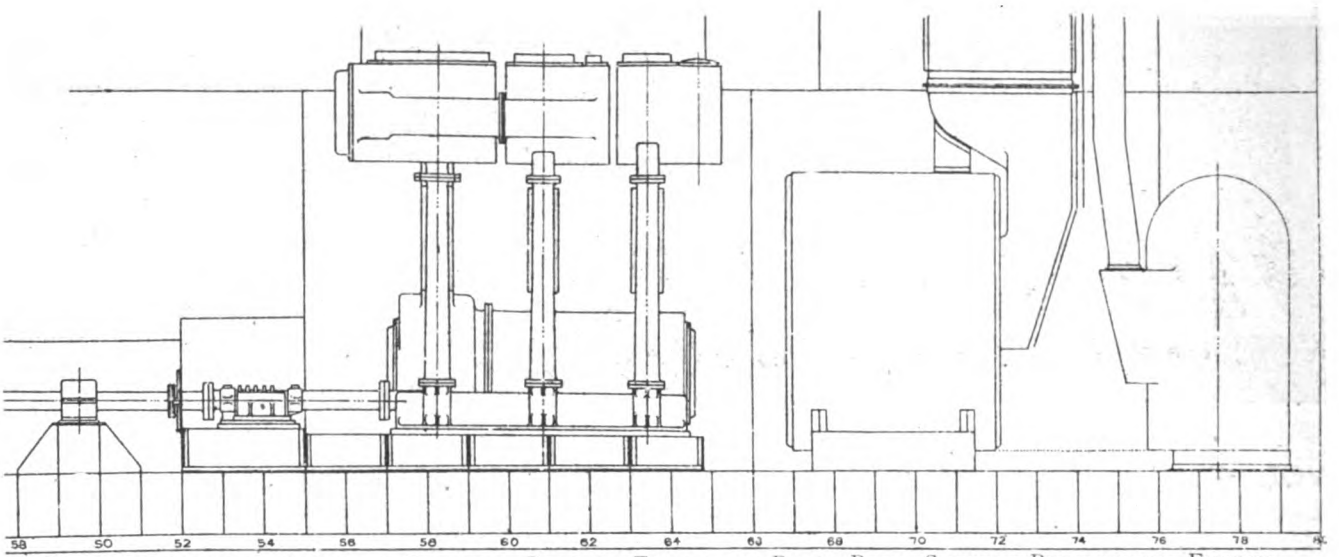


FIG. 2—LONGITUDINAL SECTION OF VESPASIAN THROUGH ENGINE AND BOILER ROOM, SHOWING RECIPROCATING ENGINES.

ments of coal and water consumption were made.

A progressive trial of eight double runs was carried out on the Whitley Bay mile at speeds from 7.5 to 10.2 knots per hour and the data of the highest and lowest runs are given herewith, and from the data obtained on this trial and on the voyage to Malta, the diagrams herewith have been plotted.

Fig. 6 (full lines) shows the results of the progressive trial to a basis of speed of vessel. The effective horsepower shown on this diagram is calculated from the resistance as obtained from a model experiment of the vessel to a scale of ⅜ in. to the foot.

Fig. 7 (full lines) shows the results as obtained on the voyage, plotted to a basis of revolutions. For the sake of comparison, the indicated horse-

RESULTS OF WHITLEY BAY TRIALS.

	S	N	Mean	S	N	Mean
Direction of run						
Speed	7.438	7.563	7.50	11.009	9.399	10.204
R. P. M.	49.9	51.27	50.58	70.0	70.1	70.05
Boiler pressure in lbs.	126	130	128	152	149	150.5
H. P. receiver pressure	73	72	72.5	128.5	127.5	128
I. P. receiver pressure	17.5	17.25	17.37	44	45	44.5
L. P. receiver pressure	— 4.75	— 6	— 5.37	3	3.62	3.31
L. P. exhaust pressure	27.0″	27.0″	27.0″	25.2″	25.2″	25.2″
Vacuum	28.25″	28.37″	28.31″	26.5″	26.5″	26.5″
Barometer	29.96″	.....	.....	.....	.....	.....
Mean H. P. pressure	30.75	30.35	30.55	47.6	47.95	47.77
Mean I. P. pressure	13.8	13.85	13.82	24.8	24.65	24.72
Mean L. P. pressure	3.91	4.125	4.01	8.86	9.51	9.18
I. H. P., H. P.	124	126	125	269	272	270.5
I. H. P., I. P.	139	143.5	141.2	351	348	349.5
I. H. P., L. P.	113	122	117.5	359	387	373
I. H. P., Total	376	391.5	383.7	979	1007	993
Temp. Circ. Inlet	55.5	.....	.....	.....	.....	.....
Temp. Circ. Disc.	76	81	78.5	106	107	106.5
Temp. Hotwell	73	71	72	118	119	118.5

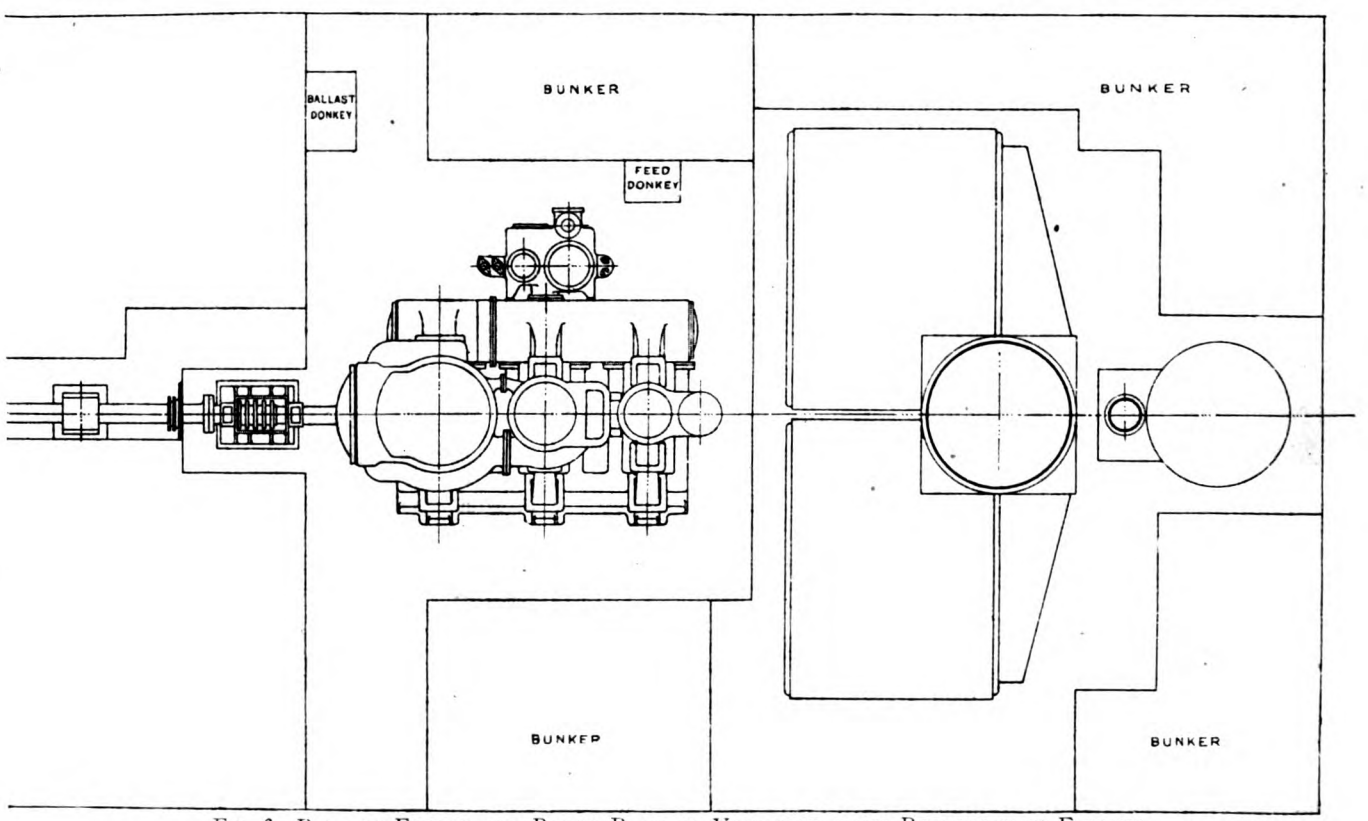


FIG. 3—PLAN OF ENGINE AND BOILER ROOM OF VESPASIAN WITH RECIPROCATING ENGINES.

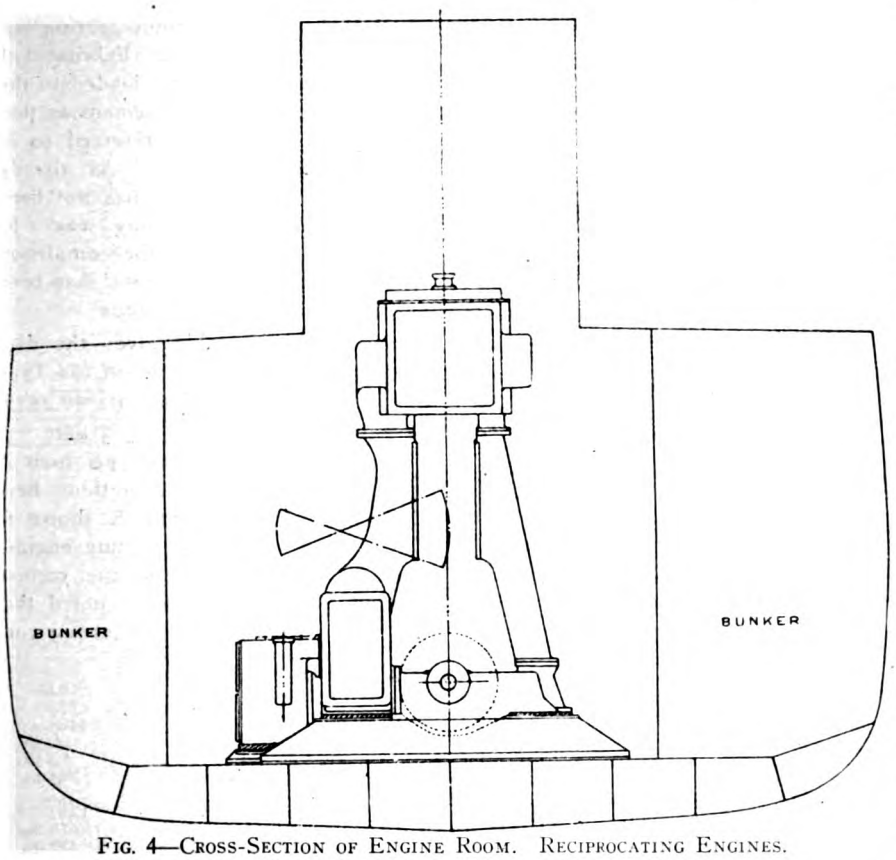


FIG. 4—CROSS-SECTION OF ENGINE ROOM. RECIPROCATING ENGINES.

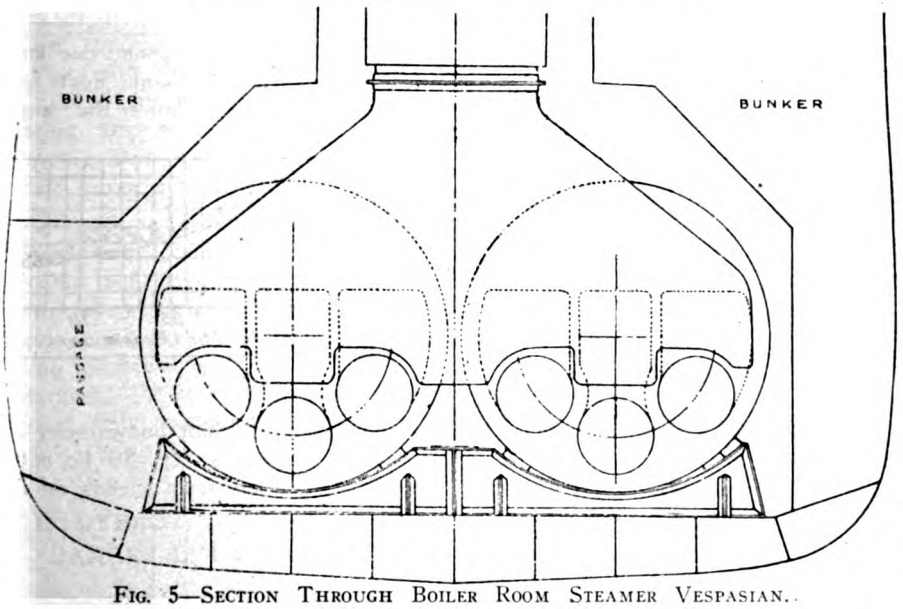


FIG. 5—SECTION THROUGH BOILER ROOM STEAMER VESPASIAN.

power taken on the progressive trial is also shown, together with the speed corresponding to revolutions taken on measured mile.

Fig. 8 (full lines) shows the water consumption per hour for main engines only and for all purposes to a basis of revolutions. The difference between these two curves represents the consumption of steam of steering engine, the exhaust of which was led to a separate measuring tank.

Fig. 9 shows the water per indicated horsepower also plotted to a basis of revolutions; and Fig. 10 shows the propulsive coefficient plotted to a basis of speed.

Fig. 11 shows the water consumption per shaft horsepower of turbines plotted to a basis of revolutions.

On the completion of the voyage, the vessel returned to the Turbinia works, where her reciprocating engine was taken out, engine seats re-modelled, and preparations made for the reception of the turbines and gearing.

Figs. 12, 13 and 14 show the general arrangement of the turbine machinery and gearing.

The only alteration made to the vessel was in the type of propelling engines; the boilers, propeller, shafting, and thrust blocks remained the same as for the reciprocating engine.

The propelling machinery consists of two turbines in "series," viz., one high pressure and one low pressure, the high-pressure turbine being placed on the starboard side of the vessel and the low-pressure on the port side. At the after end of each of the turbines a driving pinion is connected, with a flexble coupling between the pinion shaft and the turbine, the pinion on each side of the vessel being geared into a wheel, which is coupled to the propeller shaft. A reversing turbine is incorporated in the exhaust casing of the low-pressure turbine. The air, circulating, feed, and bilge pumps are of the usual design for tramp steamers, and are driven by means of a crank and connecting rod coupled to the forward end of the gear wheel shaft. The turbine and pinion shaft bearings are under forced lubrication, similar to ordinary turbine practice. The teeth of the pinions and of the gear wheel are lubricated by means of a "spray" pipe extending the full width of the face of the wheel. Independent oil pumps are fitted for supplying oil to the bearings and gear wheel. With a view to the possibility of experimenting with different lubricants for the gear wheel, the oiling system for the bearings is separate from that of the gear wheel.

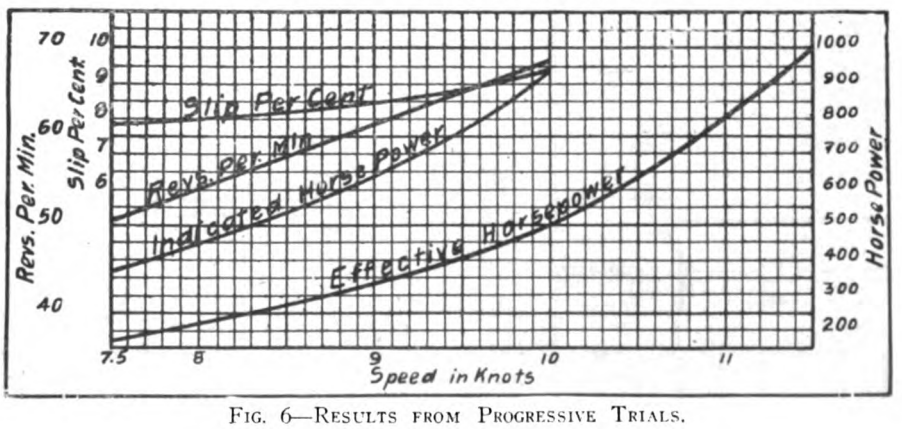


FIG. 6—RESULTS FROM PROGRESSIVE TRIALS.

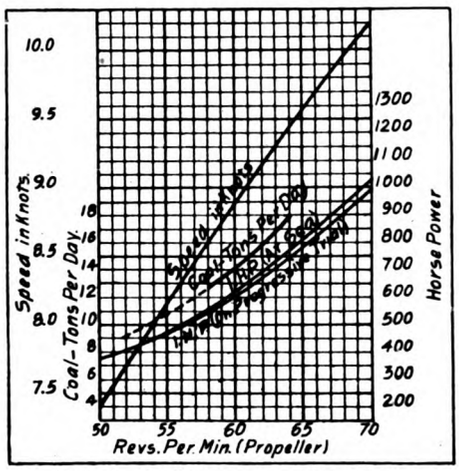


FIG. 7—RESULTS FROM VOYAGE.

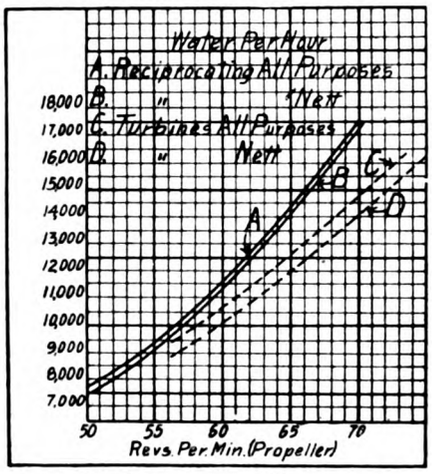


FIG. 8—COMPARATIVE WATER CONSUMPTION.

The high-pressure turbine is 3 ft. maximum diameter by 13 ft. over all length, and the low-pressure 3 ft. 10 in. diameter by 12 ft. 6 in. length. The turbines are similar in design to a land turbine, being balanced for steam thrust only, the propeller thrust being taken up by the ordinary thrust-block of the horse-shoe type, which is fitted aft of the gear wheel. A new condenser, together with a vacuum augmentor, is fitted with the turbine installation. The cooling surface of the condenser is 1,165 sq. ft.

The gear wheel is of cast iron, with two forged steel rims shrunk on. The diameter of the wheel is 8 ft. 3½ in. pitch circle, having 398 teeth—double helical—with a circular pitch of 0.7854 in. The total width of face of wheel is 24 in.; inclination of teeth 20 deg. to the axis. The pinion shafts are of chrome nickel steel, 5 in. diameter pitch circle, with 20 teeth 0.7854 circular pitch. The ratio of gear is 19.9 to 1.

On the completion of the erection, on board, of the turbine-gearing installation at the end of February of this year, the vessel was loaded to the same draught and displacement as that under which the trials referred to in the Appendix were run. As already mentioned, the propeller has not been touched or altered in any way. In the short interval since the completion of her alterations, the vessel has been out to sea on four occasions.

The following table gives the data and results of a run made off the Tyne on March 11th, 1910, at varying revolutions:—

The water consumptions per hour at the several rates of revolutions have been plotted on Diagram 8, shown in full lines for the reciprocating engines and in dotted lines for the turbine geared engines. It will be noted that under normal full speed steaming conditions an increase of about one knot is obtained with the same coal consumption. Fig. 14 shows the water consumption per shaft horsepower for the geared turbines. It will be noted that the observed mean speeds on the

RESULTS ON VOYAGE TO MALTA.

Speed in knots	8.4	9.56	10.5	10.66
Revolutions per minute	56.5	65.0	71.3	73.3
Boiler pressure	145	144	140	145
Initial pressure H. P. turbine	60 lbs.	86 lbs.	110 lbs.	121 lbs.
Initial pressure L. P. turbine	15.2 in.	12.5 in.	7.1 in.	5.5 in.
Vacuum	28.8 in.	28.8 in.	28.7 in.	28.5 in.
Barometer	29.9 in.	....	....	....
Shaft horsepower	456	740	980	1,095
Water consumption per hour, main engines.	9.070 lbs.	12,000 lbs.	14,480 lbs.	15,670 lbs.
Water consumption, all purposes	9.670 lbs.	12,620 lbs.	15,120 lbs.	16,370 lbs.
Water consumption per shaft horsepower, main engines	19.8 lbs.	16.2 lbs.	14.8 lbs.	14.3 lbs.

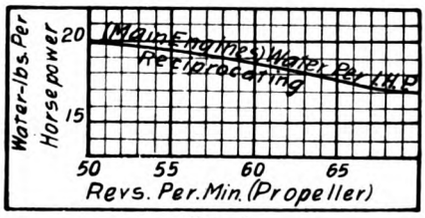


FIG. 9.

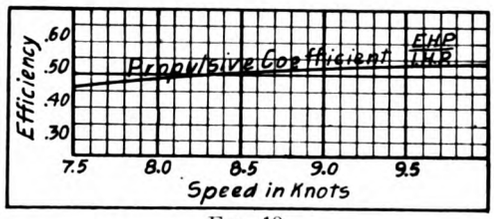


FIG. 10.

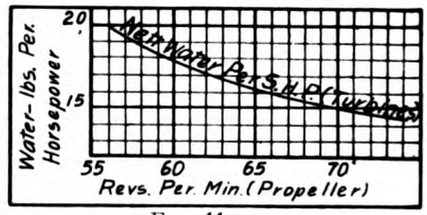


FIG. 11.

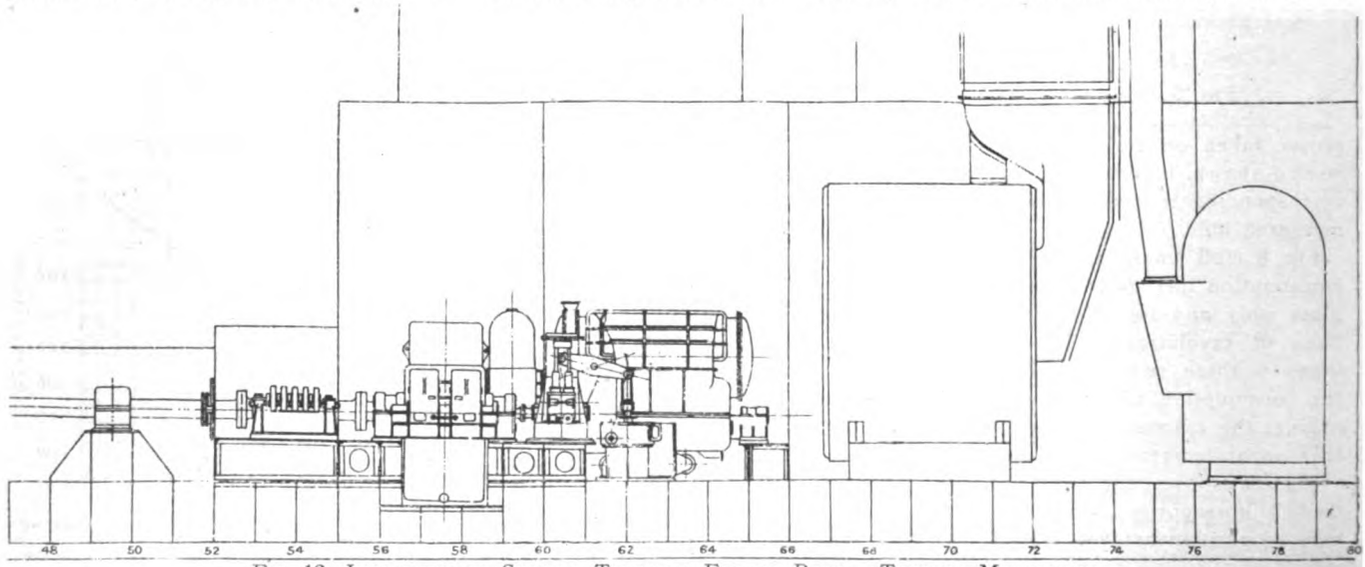


FIG. 12—LONGITUDINAL SECTION THROUGH ENGINE ROOM. TURBINE MACHINERY.

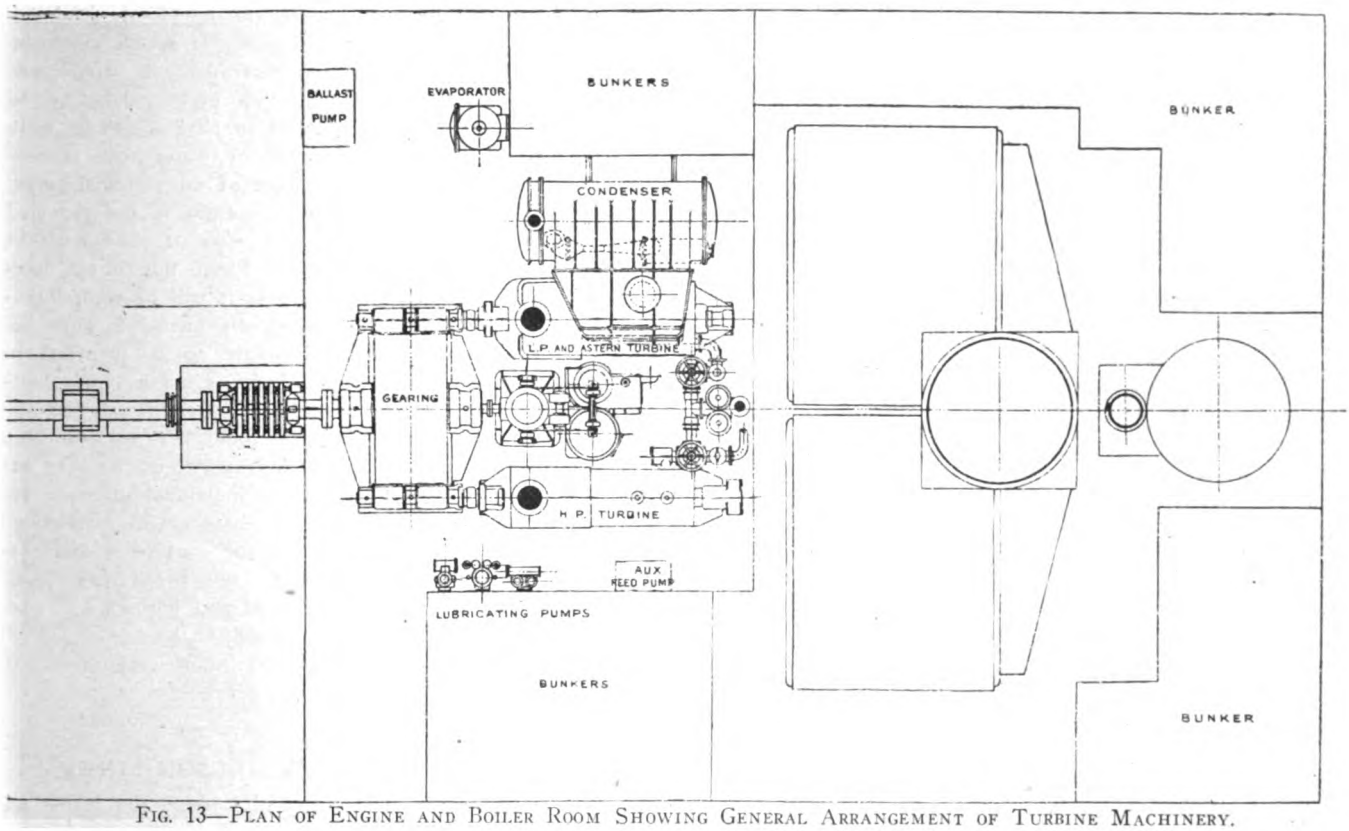


FIG. 13—PLAN OF ENGINE AND BOILER ROOM SHOWING GENERAL ARRANGEMENT OF TURBINE MACHINERY.

measured mile given in the above table correspond to the speeds obtained with the reciprocating engines at the same revolutions, thus eliminating any necessity for allowances, the weather conditions in the two cases being very similar.

It may be mentioned that the turbines and gearing have given no trouble, and have worked satisfactorily with very little noise or vibration throughout the trials. Further, there is no appreciable wear on the teeth or bearings. It is proposed to put the vessel into commission and run extended trials.

CONTRACT FOR WOODEN BARGES LET AT SEATTLE.

A contract to build four coal barges for Frank Waterhouse & Co., Seattle, has been let to John McAtee, of Seattle, for $25,272, the work to be delivered in 90 days. The range of bids was considerable, varying from $25,000 to over $50,000, while the time required for construction was estimated by the various bidders from 90 days to 180 days.

Mr. McAtee will construct the four barges at Port Blakley, nine miles across the Sound from Seattle. The barges will be built under the supervision of David Baird and John Jordison, marine superintendents for Frank Waterhouse & Co. They will be used to carry coal between the Wellington mines on Vancouver Island and ports on Puget Sound. The plans and specifications for the barges were prepared by Hall Brothers Marine Railway & Shipbuilding Co., Winslow, Wash.

Each barge will have a capacity of 600 tons of coal. They will be built of wood, following the usual covered, flat bottom type, and have no unusual features. Coal will be carried on deck.

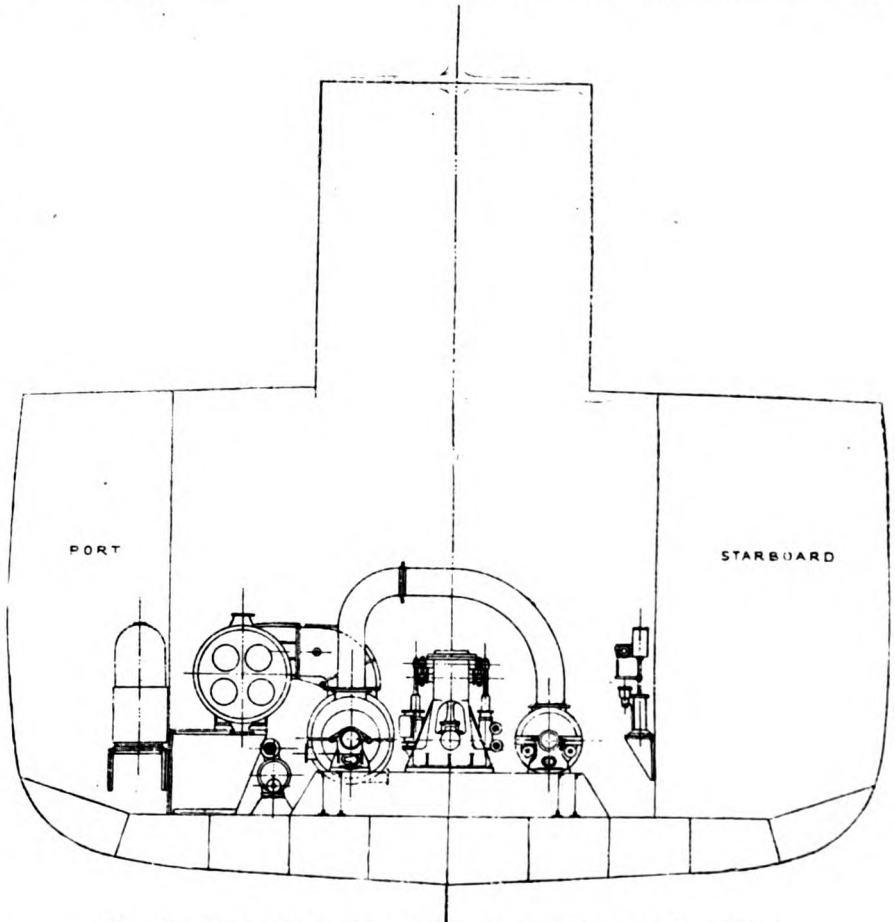


FIG. 14—SECTION THROUGH ENGINE ROOM. TURBINE MACHINERY.

IS THERE A LIMIT OF SIZE FOR SHIPS.*

By Sir William H. White.

FAVORITE questions asked by dock and harbor authorities of ship builders and ship owners are: Will there ever be an end to progress in dimensions of ships? Is there an upper limit of size for ships?

These are questions not easy to answer definitely. From the point of view of naval architects there need be no such limit, provided the necessary outlay is faced by ship owners and the necessary accommodation provided by port authorities. Higher speeds and greater carrying capacities can and will be obtained by naval architects, if they are demanded by ship owners. In my opinion the question is one to be answered by ship owners rather than ship builders; the decision will be based on commercial grounds and not on professional considerations.

Already it has happened that the construction of the Lusitania and Mauretania has been made possible by state subsidies and financial aid, granted on national grounds and for the public advantage. It may be doubted whether these vessels will be surpassed by others in speed and cost, unless similar state aid is obtained. In saying this I am not overlooking the action of the White Star line in adding the Olympic and Titanic to their fleet. These vessels differ essentially from the swift Cunarders, because they are designed for a sea speed of 20 to 21 knots, will probably require little more than half the engine power and coal, and will possess immensely greater cargo carrying capacity. It has been stated that the cost of each of these ships will approach £1,500,000 sterling, which is sensibly less than the actual cost of the great Cunarders; the less speed and coal bill will correspondingly reduce working expenses and cost of maintenance; the greater carrying capacity must lead to increased freight earning capability, if the cargoes can be secured and handled promptly so as to shorten the periods of stay in port. The Olympic and Titanic, in fact, really constitute new and splendid examples of the so-called "intermediate" type, in the development of which Bruce Ismay, and his colleagues of the White Star line, together with Lord Pirrie and Messrs. Harland & Wolff, have played so great a part. It may be assumed that these gentlemen have not embarked on the construction of these great steamships without full consideration of all the conditions and the conviction that they can be made to pay a dividend on the huge outlay involved. It is equally certain that great depth of water must be secured at the terminal ports frequented by vessels of such great size, if they are to utilize fully their freight earning capacity.

Future increase in the dimensions of merchant ships will, in my judgment, be limited and decided by commercial considerations and not by the possibilities of ship building and marine engineering. On the side of ship owners the question of earning dividends, after making proper allowance for depreciation in the book value of steamships, is and must be the governing consideration, unless state aid comes into play, and such aid will be altogether exceptional. On the side of dock owners and port authorities also commercial considerations must be operative, and it is quite conceivable that there may be a refusal to incur the large expense which would be required to meet the requirements of ships which would be altogether exceptional in dimensions. It is a matter of common knowledge that even in existing circumstances the largest merchant ships not unfrequently fail to obtain full cargoes, or to utilize their maximum freight earning capacity. Only when exceptionally favorable conditions prevail are these vessels fully laden; and the collection of full cargoes for such vessels is not an easy matter, requiring the creation and maintenance of extensive and expensive organizations even on special trade routes between first-class ports. If vessels remain in ports for long periods in order to embark or discharge full cargoes, their earning power must be prejudiced considerably. Although it is universally true that the cost of sea transport is reduced when it is conducted in vessels of larger dimensions, provided that full cargoes are always carried, it may well happen that in the actual conditions of everyday service—except in special trades—vessels of comparatively moderate dimensions may prove more remunerative investments to ship owners than the largest class would be, seeing that they are so frequently far from fully laden. It is true that many existing steamships cannot load down to the draught marks sanctioned by the board of trade because the depth of water in the ports they frequent does not permit them to do so. On the other hand, it is practically certain that the occasions are few on which they could secure cargoes which would correspond to their legal load lines, even if there were no limits of depth of water at the ports. If speeds are to be still further increased, it would undoubtedly be of great advantage to naval architects to have a greater margin of draught of water than is now available at most of the principal ports; and if such a margin is not provided the lengths and costs of ships must be made greater. From this brief statement of the case it will be seen, therefore, that the settlement of what accommodation ought to be provided in harbors and docks is not a simple matter or one to be decided only on the basis of what would best suit the ship builder, the ship owner, or the port authorities. Their individual interests are diverse and to some extent conflicting; the case is one for conference and mutual concession; and the future developments of ships and harbors are likely to be governed finally by considerations of the balance of commercial advantage to the whole community.

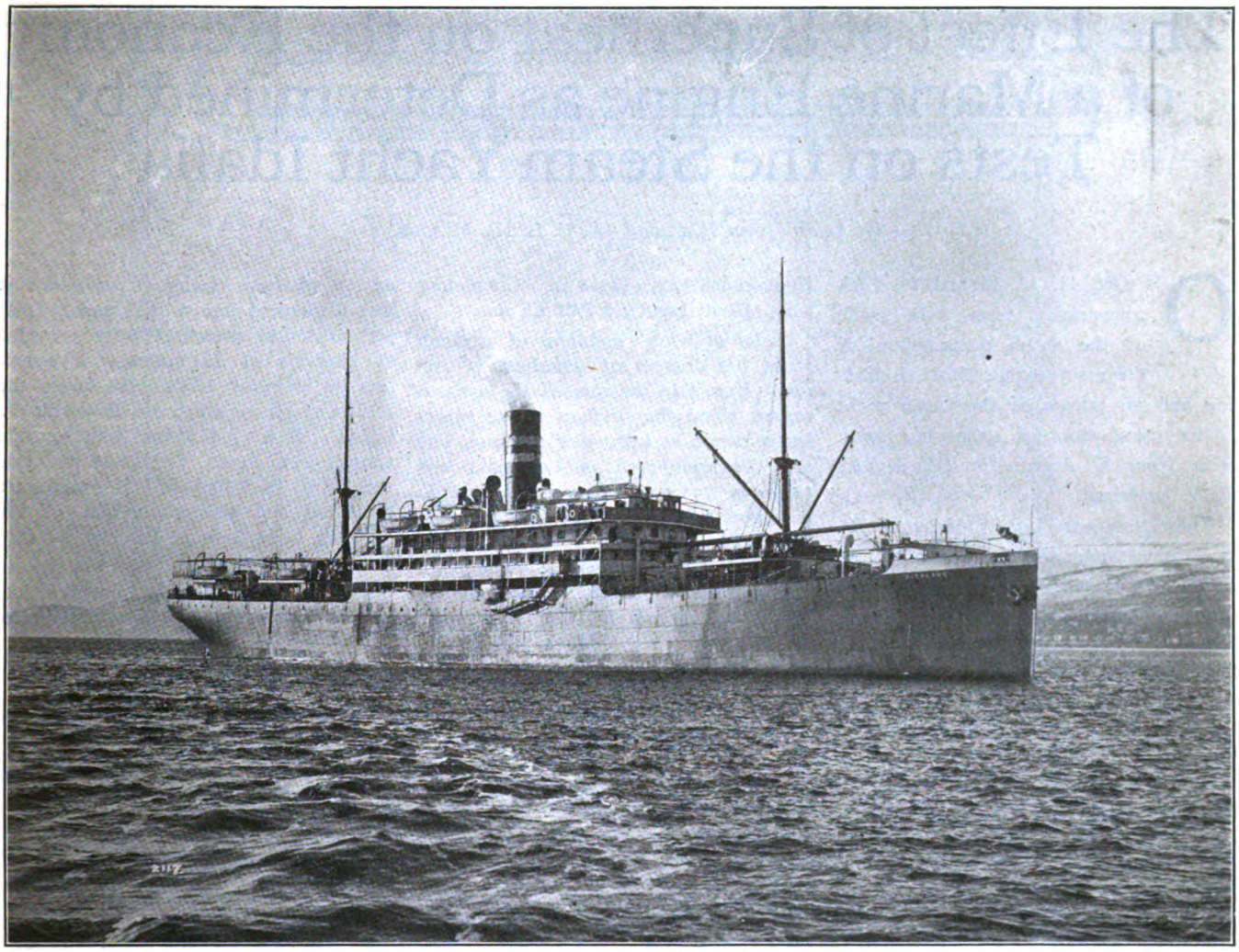
*An extract from the presidential address of Sir William Henry White, honorable president of the Hartley University College Engineering Society, Southampton, Jan. 29, 1910.

A NEW NELSON LINER.

The Highland Laddie, the latest addition to the fleet of Messrs. H. and W. Nelson, will prove a notable addition in the link of steam communication between England and South America. She has been built by Messrs. Cammell, Laird & Co., of Birkenhead and Sheffield, and is the first of four steamers of a similar type with which Messrs. Nelson have entrusted the Mersey side firm. Incidentally, her construction shows what the Mersey can do in the way of expeditious construction of high-class specialized steamers. The keel plate of the Highland Laddie was laid down in March of 1909. The hull was launched at the end of October of the same year, and on March 5, 1910, the vessel was ready to run her trials.

The Highland Laddie is a handsome steel screw steamer of the following dimensions: Length, 420 ft.; beam, 56 ft.; depth of shelter deck, 37 ft. 6 in.; gross tonnage, 7,500 tons; indicated horse power, 4,600. Externally she presents a striking picture, the lines of the hull and the imposing deck erections of the passenger accommodation, the massive funnel and tapering masts giving her a handsome and yacht-like appearance. The ship has been built to the requirements of the Board of Trade and the highest class of Lloyd's Register.

There are complete orlop, main, upper and shelter decks of steel, the orlop deck aft forming crown of tunnel. A cellular double bottom runs all fore and aft. There are three holds for-



THE NELSON LINER, HIGHLAND LADDIE.

ward and 2 aft with the engines amidships.

The machinery consists of a set of triple expansion engines of the most modern description, having cylinders 31, 51 and 86-in. diameter, respectively, x 4-ft. 6-in. stroke.

Steam is supplied by three single-ended return tube boilers, working with Howden's forced draft, and by one single-ended boiler working under natural draft. All the boilers are 16 ft. 6 in. diameter.

No. 3 hold is arranged for carrying coal on the outward journey, the permanent bunkers providing the supply for the return journey, the total being about 3,000 tons.

Immediately above the shelter deck amidships, is the saloon deck, having accommodation for 85 first-class passengers in three-berth rooms in a large steel deck house with dining saloon at forward end and lavatories at the center line abaft engine casings.

Immediately above the saloon deck, a promenade deck of the same length is fitted, having large music room and library at the forward end and smoke room at the after end. The boat deck is fitted immediately over this with a steel house on same containing accommodation for captain and officers forward, and engineers aft.

The first-class dining saloon is panelled in dark oak, with a series of alcoves at each side, each alcove being arranged to seat eight persons. A special feature of the public rooms is the arrangement of bay windows of Gothic design with diamond cut-glass. From the center of saloon a grand double staircase ascends to the music room immediately above, this room being panelled in light Austrian oak. Both rooms and stairway are effectively lighted from a beautiful decorated stained glass dome skylight of purely oval shape.

Handsome accommodation is provided aft under shelter deck for 36 second-class passengers with deck-house immediately above containing a spacious and well-appointed dining saloon and smoke room, pantry, etc.

All the holds and tween deck spaces both forward and aft of the machinery and bunkers, are most completely insulated and equipped with meat rail and hooks and everything necessary for the successful transport of chilled meat.

The refrigerating plant is one of the most powerful afloat, is placed on the upper deck immediately abaft the engine casing and the brine tank houses are built between the main hatches on the shelter deck with decks extended out to ship's sides for supporting the steam winches.

The gross tonnage of the ship is about 7,150 tons and the net about 4,500, the total capacity of holds and tween decks, available for the carriage of meat being about 343,000 cu. ft.

The vessel is rigged as a two-masted schooner with derrick tables at each mast for carrying six derricks and four chain-driven winches to each.

Very powerful steering gear is placed on the upper deck right aft with telemotor to navigation bridge and to the after docking bridge.

The Effect of Superheat on the Economy of a Marine Engine as Determined by Tests on the Steam Yacht Idalia*

By Lieut. John Halligan Jr., U. S. N., Member.

On Oct. 11, 12, 13 and 14, 1909, comparative tests were made of the steam consumption of the main engine, feed, circulating and air pumps of the steam yacht Idalia, using saturated steam and steam with from 57 degrees to 105 degrees Fahr. superheat.

These tests were conducted by Dr. D. S. Jacobus, under the direction of W. D. Hoxie, the owner of the Italia, through whose courtesy tests 3, 4 and 5 were witnessed by the writer, representing the bureau of steam engineering.

The Idalia is of the following general dimensions: Length over all, 178 ft.; length of waterline, 140 ft.; beam, 20 ft.; depth, 10 ft.; draught, 9 ft.; gross tonnage, 201; net tonnage, 111.

She is propelled by a four-cylinder, triple-expansion engine, 11½, 19, 22 11/16 and 22 11/16 by 18 in. stroke, the valves of which are all of the piston type.

Steam is supplied by a Babcock & Wilcox boiler, burning anthracite coal, with 65 sq. ft. grate surface and 2,500 sq. ft. heating surface. A superheater of 340 sq. ft. heating surface is fitted, as shown in Figs. 2 and 3.

The auxiliaries connected with the tests are of the following dimensions:

Feed pump, 6 x 4 x 6 in. Air pump (independent), 6 x 12 x 8 in. Circulating pump (centrifugal), 5 7/16 x 5 in.

Under ordinary conditions of cruising, about 100 degrees of superheat is carried. Except in the case of the dynamo engine, all of the auxiliaries take superheated steam at full boiler pressure. The only lubricant used in the main and auxiliary steam cylinders is fine graphite mixed with water. On the main engine, this mixture is introduced by means of a hand-lubricating pump fitted at the throttle, which supplies all the lubricant required for the four main pistons and their respective valves. No difficulty has been experienced in the upkeep of the plant attributable to the use of superheated steam. That the cylinders are in excellent condition is evidenced by the efficiency of the engine, as shown on the tests.

The tests consisted of runs under conditions that were practically identical as regards their effect on the results. The main engines and auxiliaries were run at nearly constant speeds. The same indicators, thermometers and gages were used in all the tests, so that the results are strictly comparable.

The steam used by the main engine, the feed, the air and the circulating pumps (all of which are independent) was determined by weighing the condensed steam discharged from the surface condenser, it being pumped from the hot-well into a weighing tank mounted on platform scales, from which it was discharged into a feed tank. Temperatures and pressures were recorded at intervals of 15 minutes. Frequent sets of indicator cards were taken, the results of all of which are shown in the tables. New indicators with outside springs were used. The gross and tare weights of each tank full of water were measured and the net weight of the partially filled tank at the end of each hour was recorded.

The dynamo engine was not run during the tests. The only other auxiliaries —the blower engines—exhausted into the atmosphere.

No attempt was made to record coal consumption or other boiler data, as the tests were too short to afford accurate data of this sort.

The tests were, however, of sufficient duration to give an accurate determination of steam consumption, as is evidenced by the uniformity of the hourly data. The result for any hour of the tests plots very close to the curve shown in Fig. 5.

The superheater shown in Figs. 2 and 3 was designed to provide 100 degrees of superheat; this established the upper limit of the tests. The lower degrees of superheat were obtained by mixing superheated with saturated steam, and by partly shielding the superheater from the hot gases by means of asbestos mill board. It was impossible with the means

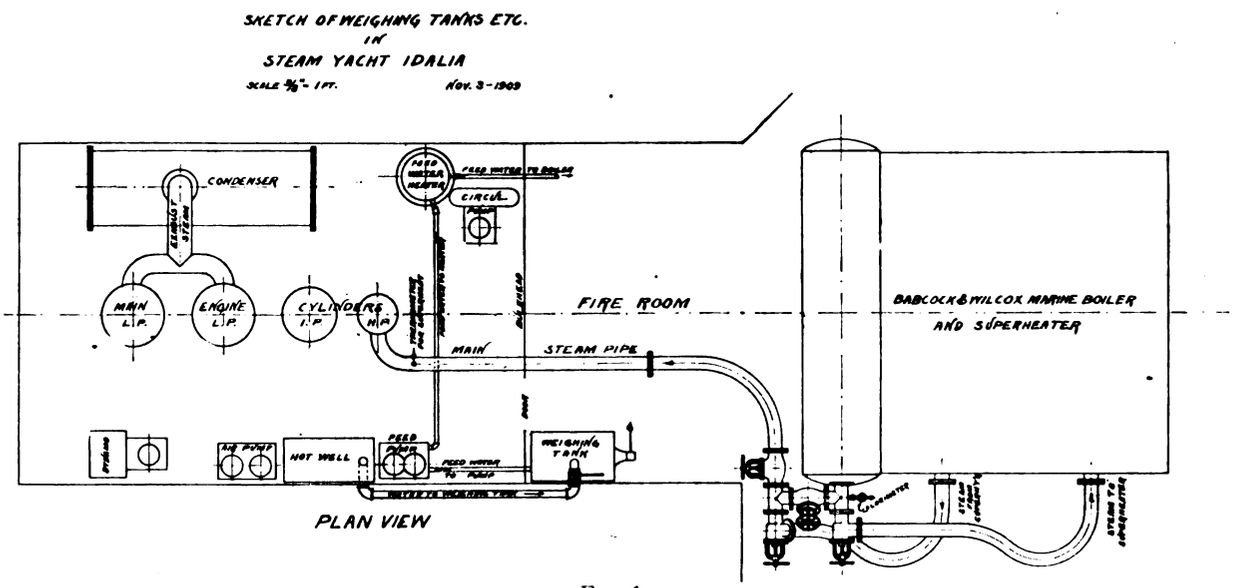


Fig. 1.

*Reprint from the *Journal of the American Society of Naval Engineers.*

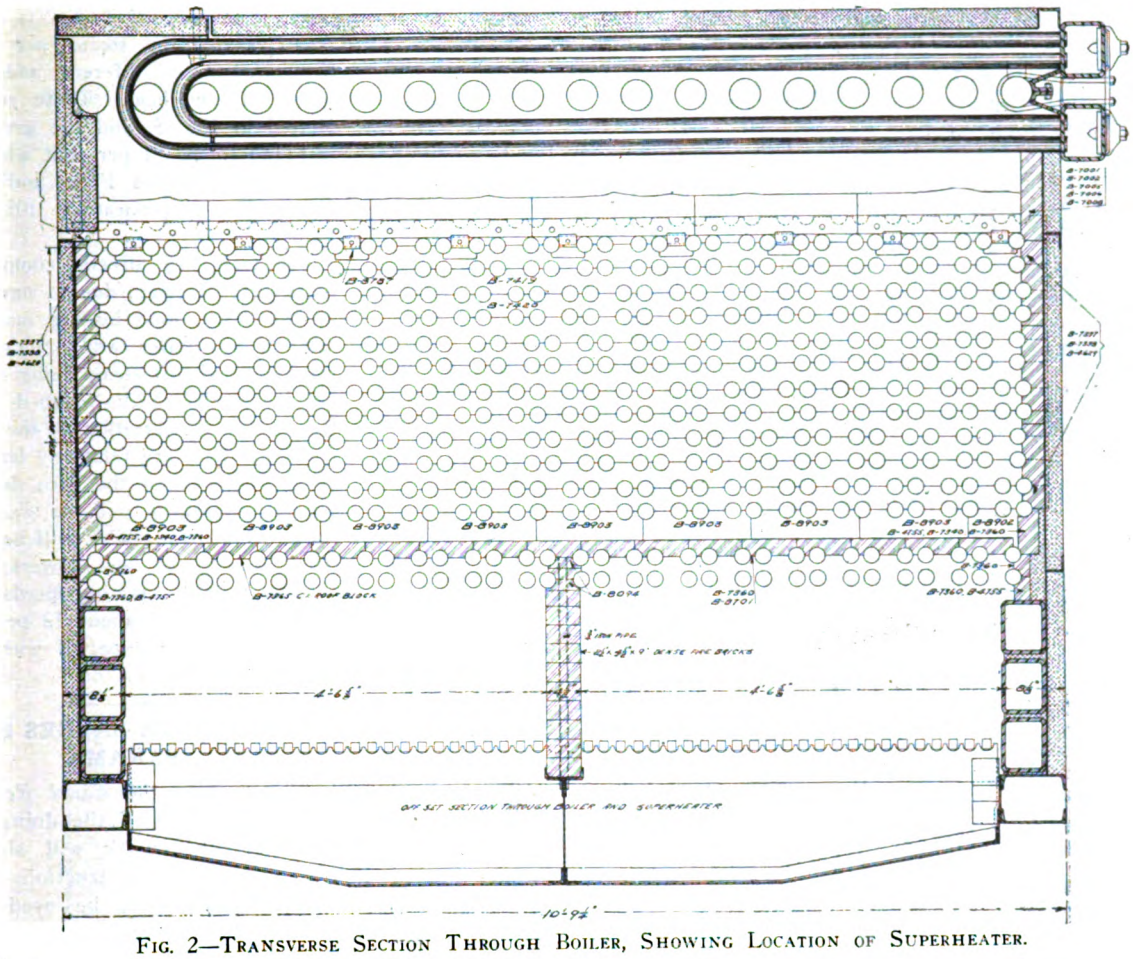


FIG. 2—TRANSVERSE SECTION THROUGH BOILER, SHOWING LOCATION OF SUPERHEATER.

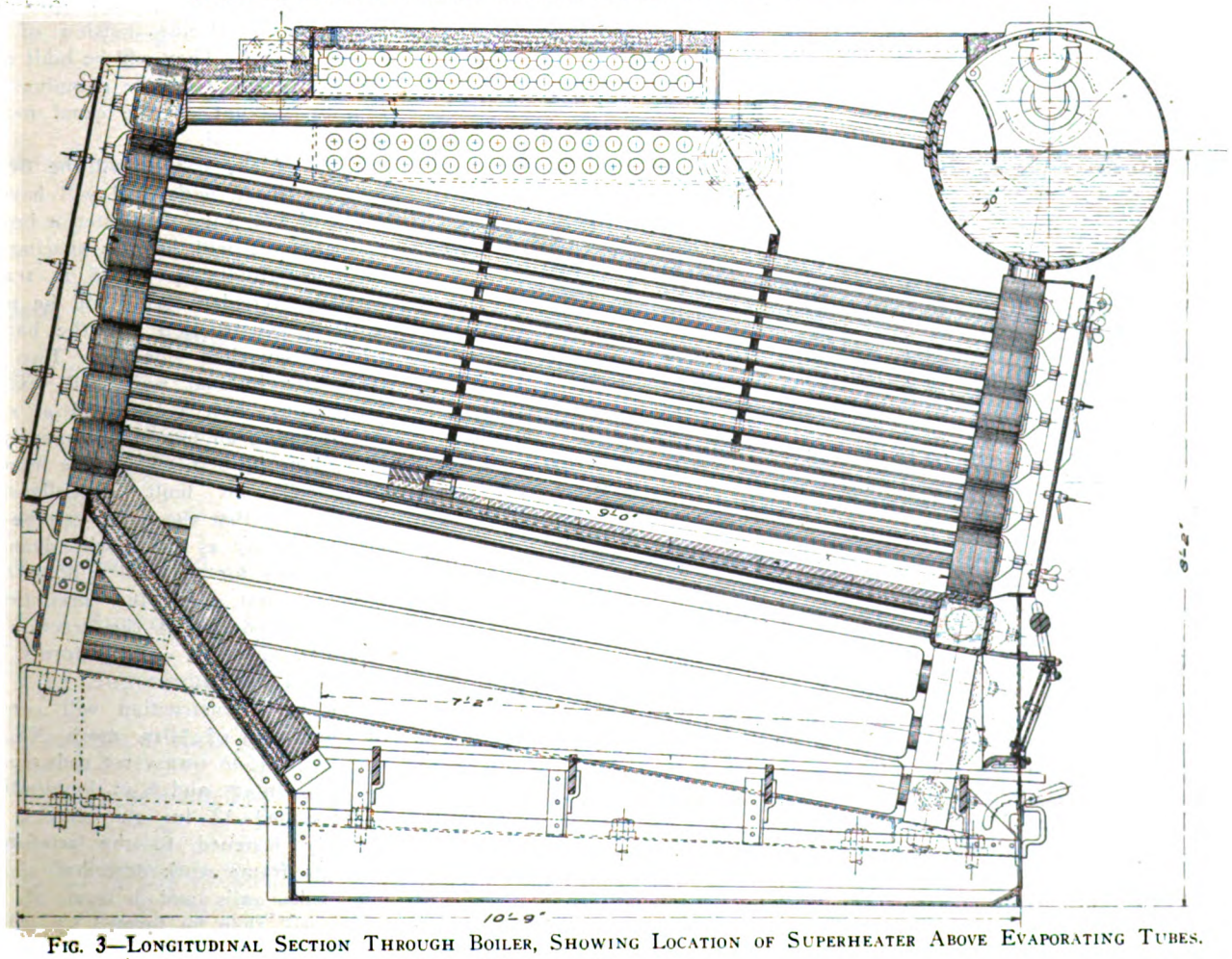


FIG. 3—LONGITUDINAL SECTION THROUGH BOILER, SHOWING LOCATION OF SUPERHEATER ABOVE EVAPORATING TUBES.

SUMMARY OF INDICATOR CARDS.

SATURATED STEAM.

Date. 1909.	Time.	Card.	Mean effective pressure. H.P.	I.P.	F.L.P.	A.L.P.	Water per hour.
Oct. 11.	2:15						
	2:30	1	80	38.0	13.0	12.0	
	3:00	2	75	37.0	12.5	11.5	
	3:15						9,177
	3:30	3	75	37.5	12.0	11.5	
	4:00	4	75	38.0	13.0	12.5	
	4:15						9,214
	4:30	5	86	40.0	13.75	13.0	
	4:45						5,101
	Averages.....		78.2	38.1	12.85	12.1	9,397

Collective I.H.P., 512.34.

SUPERHEATED STEAM, 57 DEGREES.

Date. 1909.	Time.	Card.	Mean effective pressure. H.P.	I.P.	F.L.P.	A.L.P.	Water per hour.
Oct. 14.	2:30						
	2:35	1	78.5	37.0	13.25	12.25	
	2:55	2	84.0	37.5	13.25	12.25	
	3:15	3	81.0	37.5	13.00	12.25	
	3:30						8,571
	3:35	4	70.5	33.0	11.50	11.00	
	3:55	5	80.5	37.0	13.25	12.25	
	4:15	6	75.0	37.0	11.75	11.85	
	4:30						8,290
	Averages		78.25	36.5	12.67	11.98	8,430

Collective I.H.P., 495.2.

SUPERHEATED STEAM, 88 DEGREES.

Date. 1909.	Time.	Card.	Mean effective pressure. H.P.	I.P.	F.L.P.	A.L.P.	Water per hour.
Oct. 14.	9:45						
	9:55	1	89.0	35.0	12.00	11.50	
	10:15	2	85.0	33.0	11.66	10.125	
	10:35	3	91.0	37.0	12.50	11.50	
	10:45						7,965
	10:51	4	95.0	37.0	12.50	12.00	
	11:15	5	95.0	37.0	13.65	12.60	
	11:35	6	87.5	37.0	12.10	12.00	
	11:45						8,291
	11:55	7	85.0	36.0	13.75	12.50	
	12:15	8	85.0	35.0	12.50	12.25	
	12:35	9	90.0	36.0	13.00	12.50	
	12:45						8,447
	Averages.....		89.17	36.0	12.63	11.89	8,234

Collective I.H.P., 521.14.

at hand to secure a lower degree of superheat than 57 degrees.

In the test with saturated steam, the superheater was completely cut off from the steam line and vented to the atmosphere. The saturated steam was shown to be dry by a throttling calorimeter.

The results obtained are shown in the following tables and, in the form of a curve, in Fig. 5. It will be noted that the water consumption of the main engine and auxiliaries was 18.3 lbs. per I. H. P. per hour with saturated steam, and 15.5 lbs. when steam superheated 105 degrees was used.

Expressing these results as heat consumption per I. H. P. per minute we have, respectively, 365.7 and 326.9 B. T. U's. That is, the heat consumption with 105 degrees superheat is 89.4 per cent of that when using saturated steam. In other words, the tests indicate that there is a net gain of 10 per cent obtained by using 100 degrees Fahr. of superheat. This may be expressed as a saving in coal of 1 per cent for each 10 degrees of superheat.

The foregoing tests conclusively prove the economy resulting from the use of superheated steam. In the following table, "Summary of Tests," is found the actual saving in steam per indicated horsepower for different added increments of superheat. These results are plotted in Fig. 5, and the gross saving is found to be 7.1 per cent when superheating 57 degrees Fahr. and 15.3 per cent when superheating 105 degrees Fahr.

The tests are directly comparable in the saving of steam due to superheating, as the work done by the main engine and its auxiliaries was practically constant, the exhaust steam being condensed and carefully check-weighed hourly throughout the duration of the trials.

Where there are relatively large losses from condensation the gain due to the use of superheat will be even higher than here shown. This will be the case when running at low powers; so that for the ordinary cruising speeds of naval vessels a gain of about 12 per cent in economy may be expected with 100 degrees superheat.

CONCRETE BARGES FOR PANAMA.

According to the *Canal Record*, the official chronicle of the doings in the Panama zone, work will shortly be begun on the construction of three concrete barges to be used in supporting the dredging pumps for the hydraulic excavating and pumping plant of the Pacific division of the Panama canal. They will be built near the site of the hydraulic pumping station at a point on the canal nearly opposite Corozal.

Each of the barges will be 64 ft. long by 24 ft. wide, and will have a depth of 5 ft. 8 in. The interior beams and columns will have a spacing of 10 ft. longitudinally and 8 ft. transversely. Wooden forms will be used in their construction and the barges will be launched sidewise. Two interior longitudinal walls will extend throughout, with a bulkhead at each end, forming an interior compartment 40 ft. long by 8 ft. wide. The interior form will be built in collapsible sections, so that the latter can be removed readily as the work advances. The frames for the hull will be constructed first, and the preliminary work will consist of the erection of supports on which wooden forms will be placed.

The wall construction will consist of one layer of ½-in. mesh No. 12 wire cloth; ½-in. transverse rods spaced 8 in. on centers, and ½-in. longitudinal rods spaced 12 in. on centers, all securely fastened to the reinforced concrete frame work described above. The side walls and bottom of the barge will then be formed by laying

SUPERHEATED STEAM, 96 DEGREES.

Date. 1909.	Time.	Card.	Mean effective pressure. H.P.	I.P.	F.L.P.	A.L.P.	Water per hour.
Oct. 12.	3:00						
	3:15	1	84.75	...	10.25	10.00	
	3:45	2	91.50	35.00	14.50	12.00	
	4:00						7,842
	4:15	3	93.00	33.75	...	11.00	
	4:50	4	87.50	35.00	13.50	11.50	
	5:00						7,994
	5:04	5	87.00	34.50	13.00	11.00	
	5:26	6	87.70	35.00	12.75	10.50	
	5:30						3,920
	Averages.....		88.57	34.65	12.8	11.0	7,902

Collective I.H.P., 498.27.

SUPERHEATED STEAM, 105 DEGREES.

Date. 1909.	Time.	Card.	Mean effective pressure. H.P.	I.P.	F.L.P.	A.L.P.	Water per hour.
Oct. 13.	2:35						
	3:00	1	...	33.0	11.25	10.25	
	3:15	2	91.0	35.0	13.90	11.50	
	3:35						7,793
	3:38	3	95.0	35.0	12.15	10.75	
	3:54	4	92.5	34.0	12.50	10.80	
	4:10	5	95.0	34.5	12.10	10.50	
	4:29	6	92.5	35.0	12.30	10.90	
	4:35						7,863
	4:48	7	91.0	34.0	12.65	11.00	
	5:05	8	91.0	36.0	12.15	11.00	
	5:24	9	83.5	35.0	11.50	10.80	
	5:35						7,713
	Averages.....		91.4	34.6	12.17	10.83	7,790

Collective I.H.P., 502.15.

on several coats of plaster made of Portland cement mortar, and troweled down to a hard surface. The plaster will be laid on first from the outside, and an additional coat laid on from the inside, so as to thoroughly cover the ½-in. mesh and steel rods.

The deck of the barge will consist of concrete slabs 3½ in. thick, having spans of 10 ft. in length and 8 ft. in width, reinforced with ½-in. rods, both longitudinally and transversely. Wells are provided for pumping.

The dredging pump, motor and equipment, weighing approximately 60,000 lbs., will be located near the middle of the barge. The maximum draught of the barges when loaded, will be about 3 ft. They can be moved readily from one place to another in the channel, and each will be equipped with four mooring bits situated a few feet back from each corner, secured to the barge by long bolts imbedded in the concrete of the side columns and diagonals.

The barges will be erected on cribbing built for the purpose, and launched from ways, on the west bank of the basin, a short distance south of the Miraflores lock site.

The steamship Kentuckian, building for the American-Hawaiian Steamship Co., was launched from the yard of the Maryland Steel Co., Sparrows Point, Md., on March 10.

SUMMARY OF TESTS.

Date, 1909.	Conditions.	Pressures. Throttle.	First receiver.	Second receiver.	Vacuum.	Temperatures. Feed.	Hotwell.	R.p.m. Air pump.	Circulating pump.	Revolutions per minute, main engine.	I.H.P., main engine.	Water per hour, total.	Water per I.H.P.	Per cent. saving of steam.
Oct. 11	Saturated.....	190	68.4	9.7	25.5	201	116.0	57	196	194.3	512.3	9,397	18.3	....
14	Superheat, 57°	196	66.0	9.2	25.9	206	109.5	56	198	191.5	495.2	8,430	17.0	**7.10**
14	Superheat, 88°	201	64.3	8.7	25.9	205	115.0	53	196	195.1	521.1	8,234	15.8	**13.66**
12	Superheat, 96°	198	61.9	7.8	25.4	202	111.5	54	198	191.5	498.3	7,902	15.8	**13.66**
13	Superheat, 105°	203	63.0	8.4	25.2	200	111.0	45	197	193.1	502.2	7,790	15.5	**15.30**

NOTE.—These tests and their results are of special interest and value in view of the fact that they were made on installation in service, and with such refinement and accuracy that the results may be taken as conclusive and as showing the actual economy to be obtained by the use of superheat with marine engines. The tests are probably the first made on an actual installation for the purpose in which such extensive refinements and complete apparatus has been used.—*Ed. Journal.*

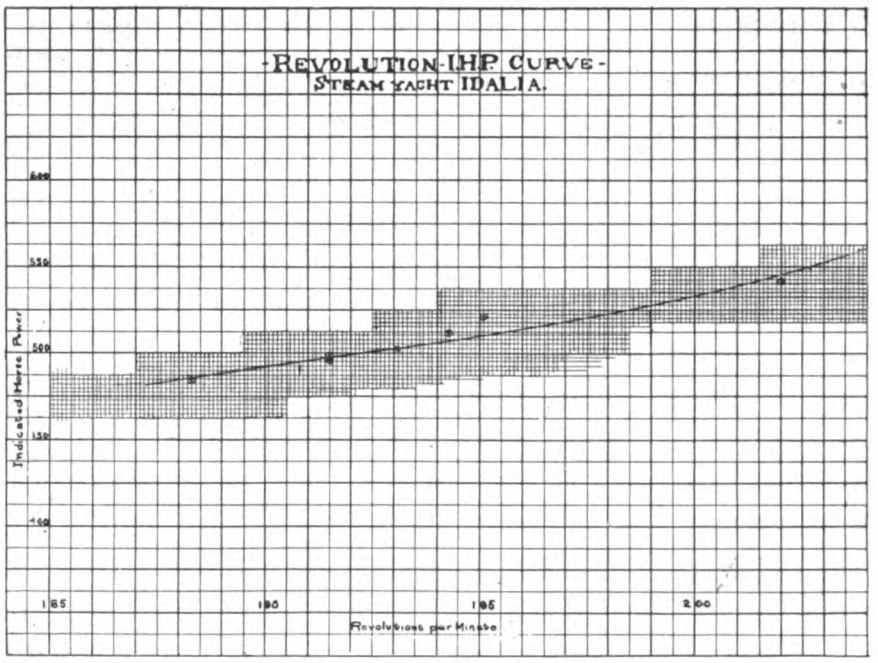


FIG. 4.

SHIP BUILDING IN THE LOWER MISSISSIPPI.

Advices from Washington are to the effect that English capitalists are contemplating the establishment of a ship yard in the lower Mississippi in the vicinity of New Orleans. As a site for a ship yard, the location is certainly one of great strategical importance. That part of the world is growing fast and is destined to become the cross roads of the continent. When the Panama canal is finished, the ships of all nations will visit the Caribbean sea and a ship yard, conveniently located, will be a prime necessity. The principal business of a ship yard is, of course, repair work and the south does not, as yet, possess a yard where a modern boat could be repaired. They all have to go to a northern port for dockage. Obviously this condition cannot last and it is not surprising that capital is turning its attention to the opportunities presented. If congress passes the Humphrey bill, the need of a ship yard in the vicinity of New Orleans will become acute. New markets will be opened up and new tonnage built to reach them. Ship building will be added to the list of the south's industries. In fact, the south possesses many natural advantages in shipbuilding and ship repair. To begin with, it is favored by low cost of material, as has been quite pertinently pointed out by S. A. Trufant, president of the Merchant Marine League of Louisiana. The Birmingham district has been wonderfully favored by nature. Coal, iron ore and flux lie in contiguous hills. The coal is mined on the mountain side and carried by gravity to the lower level, where it is made into coke to find its way into the furnace, located in a bed of limestone at the base of the mountain, while from an adjoining gully comes the ore. Probably nowhere else in the world do the three essentials of iron making lie so conveniently. These circumstances constitute a natural asset for a ship yard, for it means an unfailing source of material at low cost. The future will doubtless see many industrial developments of interest in the south, and the first of these will be shipbuilding.

STEAMER FOR CANADIAN HYDROGRAPHIC SERVICE.

The twin screw steamer Gartier, intended for the hydrographic service of the Canadian government, recently underwent her trial trip. The steamer was built at the Neptune works of Swan, Hunter & Wigham Richardson from designs of R. L. Newman, of Victoria, B. C., who was present at the trial trip.

She is 164 ft. in length by 29 ft. beam by 15 ft. depth, fitted with twin screw triple expansion engines, supplied with steam by 2 boilers working under Howden's system of forced draught. On the trial trip everything worked without the slightest hitch, and although the weather was by no means favorable a speed of over 11½ knots per hour was attained.

The equipment for her special work is very complete, including a Lucas sounding machine together with a sounding poney. The chart room is specially large, and has a large table well adapted for drawing. For inshore sounding 2 gasoline launches are provided and they are fitted with drawing boards.

The accommodation is commodious and well furnished. It includes rooms for the officer-in-charge, hydrographers, ship's officers, engineers, etc., and there are large separate mess rooms for the hydrographic staff and for the navigation staff. Steam heating is provided throughout the vessel as well as a highly efficient system of ventilation, to provide for extremes of temperature. An electric light installation with electric projector is also fitted.

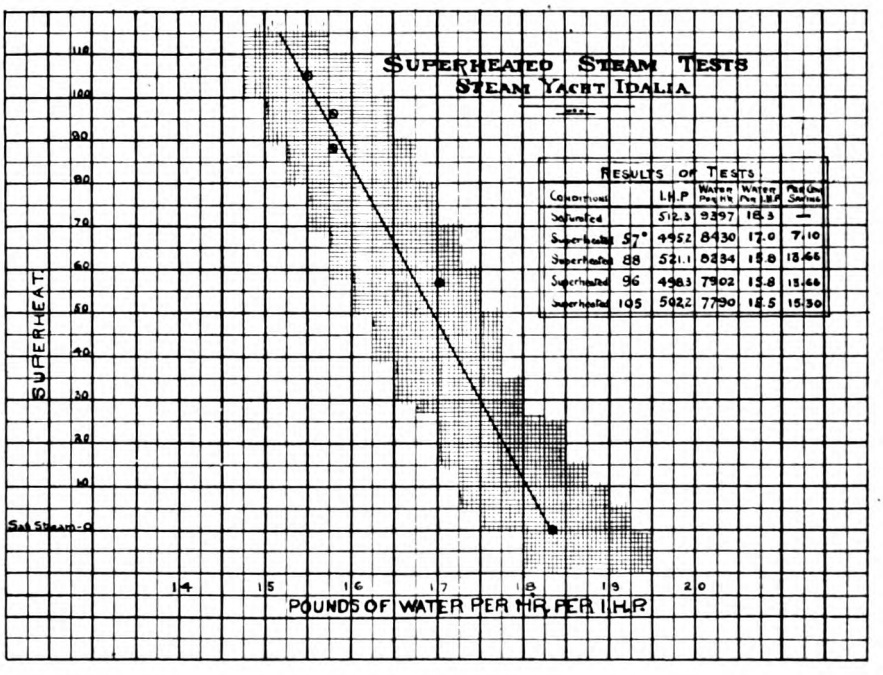


FIG. 5.

New Types of Boats for Mississippi River

THE following description, together with photos of wash drawings, are sent us by a St. Louis correspondent by courtesy of the Mississippi Valley Transportation Co.:

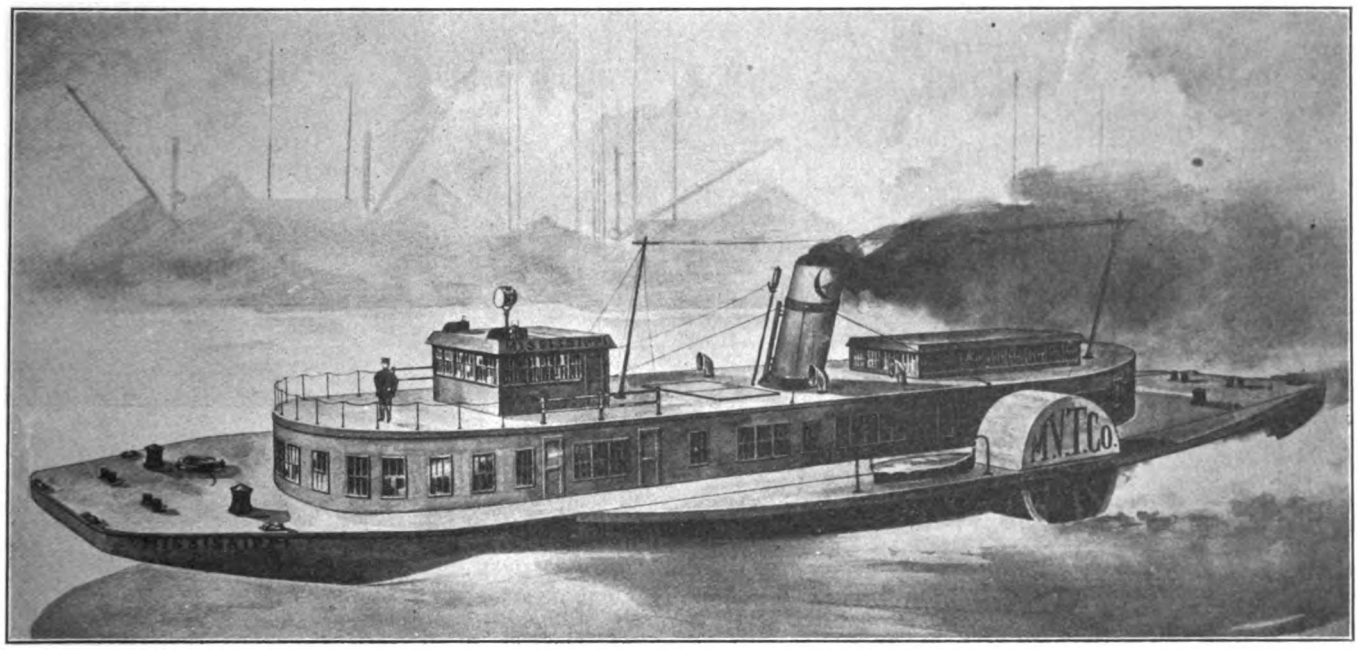
The Mississippi Valley Transportation Co., of St. Louis, organized for the purpose of operating a line of steel steamers and barges between St. Louis and New Orleans, has accepted plans for two steamers and a barge, designed by E. E. Green, consulting engineer of the American Bridge Co. at its St. Louis office, and will proceed to put the boats into commission as rapidly as they can be built.

The boats and barges represent a radical departure from any craft ever seen on the Mississippi and inland rivers, and are considered models of ingenuity. There are two types of steamboats, and one tow barge. Both of the steamers are side-wheelers, with hulls running out as gracefully as an ocean yacht.

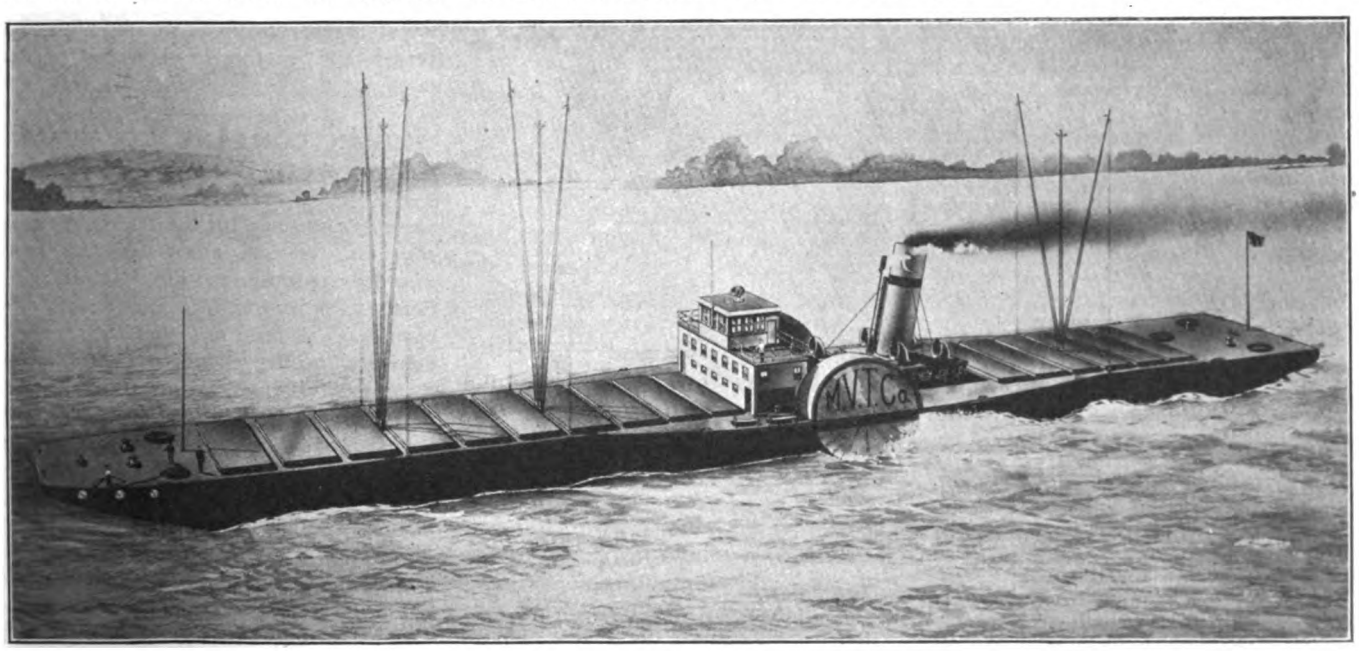
The design for the barge also has a yacht hull, bow and stern. It will be built of steel throughout. One of the steamers is intended as a tow-boat and will cost about $250,000, and the barges about $50,000 each. The barges are designed to carry 4,000 tons on 9 ft. of water, and 1,200 tons on 4 ft.

The second steamer will be known as a package freight boat. It will be something of a modification of the Great Lakes freighters. It will be 550 ft. long, 60 ft. broad, 12 ft. deep, and will draw 12 inches of water when light. Every additional foot of draft will represent 1,000 tons carrying capacity, so that the boat will carry 5,000 tons of freight when loaded to six feet. The boat will have engines of 2,000 horsepower and will travel when fully loaded, 16 miles an hour in still water. The estimated cost of the boat is $250,000.

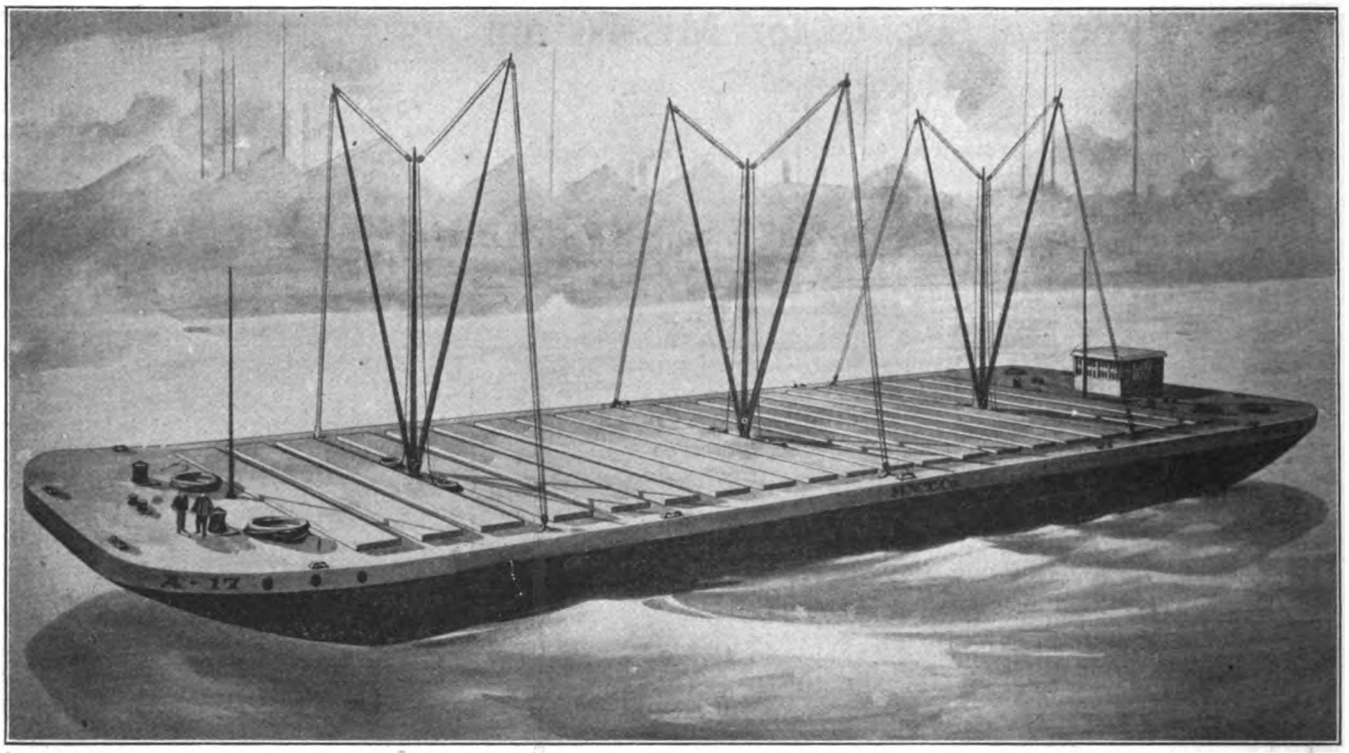
This craft will ply between St. Louis and New Orleans, making two



TOW-BOAT FOR MISSISSIPPI VALLEY TRANSPORTATION CO.



PACKAGE FREIGHT STEAMER FOR MISSISSIPPI VALLEY TRANSPORTATION CO.



TOW BARGE FOR MISSISSIPPI VALLEY TRANSPORTATION CO.

round trips each month. The transportation company estimates that she will be able to load at St. Louis 1,000 tons of packing-house products and 1,000 tons of dry-goods and other wares on each trip. She will then cross to East St. Louis and fill up her remaining compartments with coal. On the return trip she will be loaded with sugar, coffee, jute, sisal and lumber. When the lock at Keokuk Ia., is finished, this type of boat will be able to go to St. Paul and take on 2,000 tons of flour, while drawing three feet of water, then come down to Davenport and take on another 1,000 tons, 2,000 tons at St. Louis, and still draw only six feet of water for her journey to New Orleans.

The tow-boat also has a hull like a yacht. The cabins of the boats are on the main deck, where the boilers would be in the old fashioned river boat. The pilot house, looking more like the pilot house of an ocean liner than that of a river boat, is immediately above the forward cabins.

All the fuel will be taken aboard from overhead, as in the case of a locomotive tender, thus saving time and labor. The tow boat will have engines of 2,000 horsepower.

The engines, which do not appear in the photographs, are double-compound, very fast working engines. The wheels are designed to turn 40 revolutions per minute. Steam capstans and bitts will be placed forward and aft so that the boat may lash up with her tow ahead of her or tow it by a long stern line.

Smaller boats of the same type will be built for use on the White river, Yazoo and other smaller streams.

The freight barges will be long steel affairs, absolutely lacking in superstructure, even to a shed roof. The decks will be cut by a succession of hatches, through which every part of the hold may be reached.

The boats and the barges will be supplied with hoisting cranes, so that freight can be handled with the least possible waste of time and at a minimum cost. The transportation company intends to erect model docking and terminal facilities at the more important points along the Mississippi river.

The company is capitalized at $10,000,000, one fourth of which will be expended as rapidly as possible in building and equipping the river fleet. W. K. Kavanaugh, of St. Louis, is president of the company.

THE REVIEW freely but regretfully concedes that there are many yachts with which it is not familiar and the term yacht may have a local definition in the Mississippi valley, but it may be stated without fear of contradiction that there will be more than one opinion as to the "yacht-like" lines of the new river craft. So as to the package freighter. The "modification" of a Great Lakes freighter will be conceded without argument. Why the latter is taken as a prototype is not by any means clear, since there is no more resemblance than between a flat boat and a Sound steamer.

The boats, however, are very probably excellently well adapted to their purpose. Certainly Mr. Kavanaugh and his associates understand the river traffic thoroughly and know what they want to accomplish, but if the figures as to estimated powers, capacities and speeds are correctly reported, we fear that there is bitter disappointment in store for them. That the boats will be models of ingenuity there can be no question. To build a craft of the dimensions quoted, and powered for even much lower speeds, on a light draft displacement of 1,000 tons is no ordinary feat, even though built for river work. Loading and unloading and stranding strains, however, cannot be eliminated, and even with 2,000 horsepower the displacement available for the hull and equipment cannot be much, of anything, over 600 tons and naval architects will watch with interest the methods of construction followed.

MORAN COMPANY TO BUILD ANOTHER BOAT.

The contract for a new freight and passenger steamer for the Alaska Steamship Co., to cost about $350,000, was awarded recently to the Moran Co., Seattle. Work on the new vessel will commence at once and the hull will be delivered in five months. The Alaska Steamship Co. is short on tonnage and, it is understood, has offered a large bonus for every day saved within the specified five months.

The new vessel has not been named. She will be about 250 ft. in length and 44 ft. beam, built of steel with double bottom and water-tight compartments. She will burn fuel oil. The machinery will be installed by the Heffernan Engine Works, Seattle.

A Self-Dumping Barge

THE problem of the best method of dumping stone, dirt, or other spoil into water is of particular interest in Stockholm, where rock blasting and removal is continually being carried out for extensions to the harbor, or the streets.

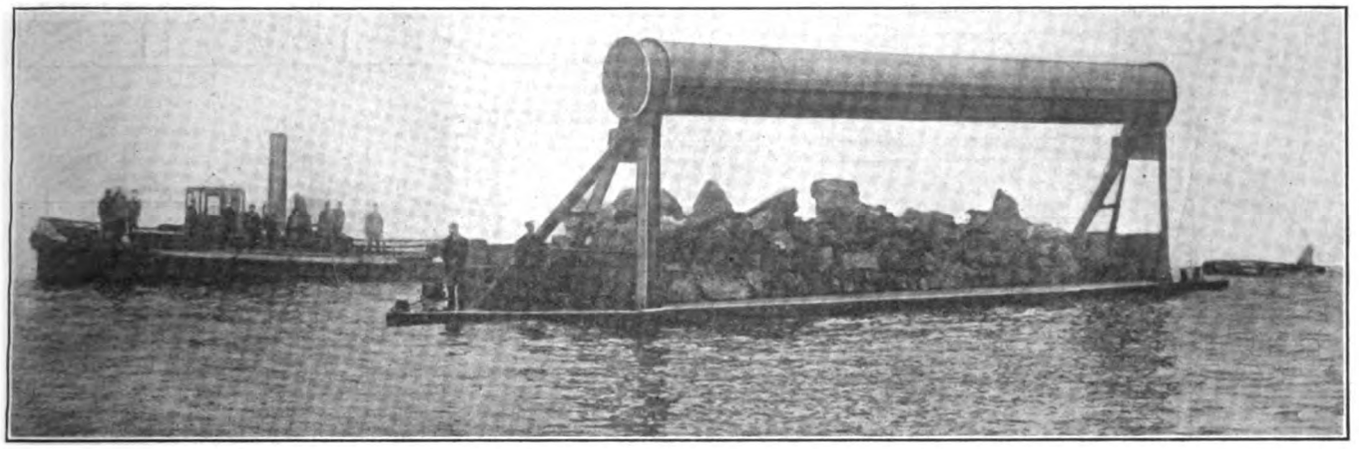


FIG. 1—THE WIKING SELF-DUMPING BARGE, LOADED.

The dumping has in general been carried out by means of the usual type of hopper barge, with doors in the bottom; but with a view to facilitate the work, many suggestions have been made for some form of automatic dumping apparatus. One of these suggestions has matured in the form of the self-dumping barge, which is shown in Figs. 1 and 2. As will be understood from these illustrations, the barge is built with a flush deck with low bulwarks on three sides, the fourth side being either left open, as shown, or provided with doors which are opened by the pressure of the load on deck, when the barge tilts over for dumping. The self-tilting of the barge is obtained by forcing water, by means of compressed air, into a cylindrical tank, which is carried by means of tripods at a height of some 16 ft. above the deck. The admission of water to this tank destroys the stability of the barge, with the result that it tilts over and discharges its load, as shown in Fig. 2.

The methods which are employed for the admission of water to the upper tank, and also for emptying it after the barge has discharged its load, will be seen in Fig. 3. Briefly, the arrangement consists of four cylindrical vessels or tanks, shown at *A*, *B*, *C* and *D* in the line engravings. At the commencement of the cycle of operations—that is, when the loaded barge has been towed to position over the dumping ground—the tank *A* contains water, *B* contains compressed air, while *C* and *D* are empty, and are open to atmosphere. A pipe is run so that the upper tank *D* is always in communication with *A*; further, by means of valves, *A* may be connected with the compressed air tank *B*, while *C* may be put in communication concurrently with *D* and *A*. When the barge is to be tipped, the valve between *A* and *B* is opened, so that the compressed air in *B* forces the water in *A* into the upper tank *D*. This destroys the stability of the barge, which tips over, so that the load slides off into the water. The connection between *A* and *B* is now closed, and *A* is at the same time put in communication with the atmosphere; normally at this stage *D* will be higher than *A*, so that the water in *D* flows back into *A*, and the barge returns to an upright position. If, however, owing to the nature of the load, dumping does not occur until the tank *D* is at or near the surface of the water, the above operation will not right the barge, as the level of *D* will then be below *A*. In this case the valve putting *C* in communication with both *D* and *A* is opened, and as *C* is always lower than *D*, the water flows from *D* to *C*, and the barge begins to right, until a position is reached when *A* is lower than *C*, when the water flows into *A*, and the barge rights completely as before.

The valves and mechanism by which the various interconnections between the tanks are made, or broken, are detailed in Figs. 4 and 5, while the positions of the various pipes and the operating rope are shown in Fig. 3. The valve-chest, shown in section in Fig. 4 is connected by the pipe *d* to the compressed air tank *B* and by pipe *b* to the water-tank *A*. The stop-valve *e* is used to shut off the compressed-air supply from the valve chamber *F* until the barge is ready for dumping, when it is opened, admitting the compressed air to the back of the slide-valve *H*. Depending upon the position of the slide-valve, pipe *b* connecting to tank *A* is in connection either with the compressed air in chest *F*, or with the atmosphere through the left-hand side valve-port. The position of the valve-chest on the barge is shown in the upped left-hand corner of the deck plan in Fig. 3. This figure also shows the pipes connecting from the valve-chest to tanks *A* and *B*, the pipe *E* connecting tanks *D* and *A*, and the rope *l*, which is pulled to operate the

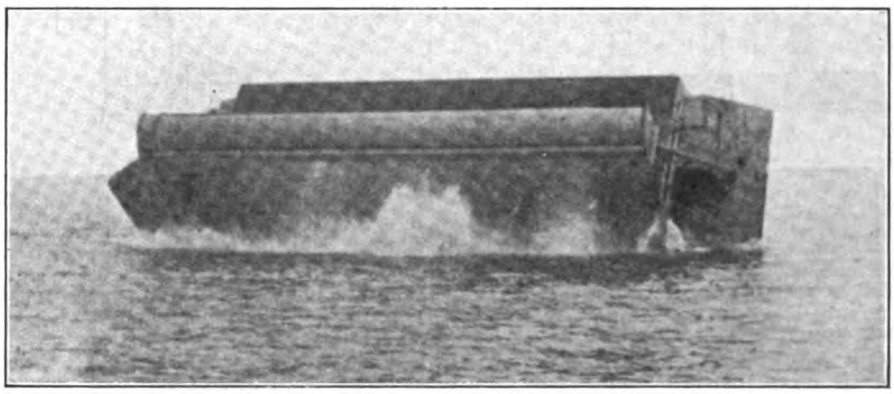


FIG. 2—THE WIKING SELF-DUMPING BARGE, DUMPING.

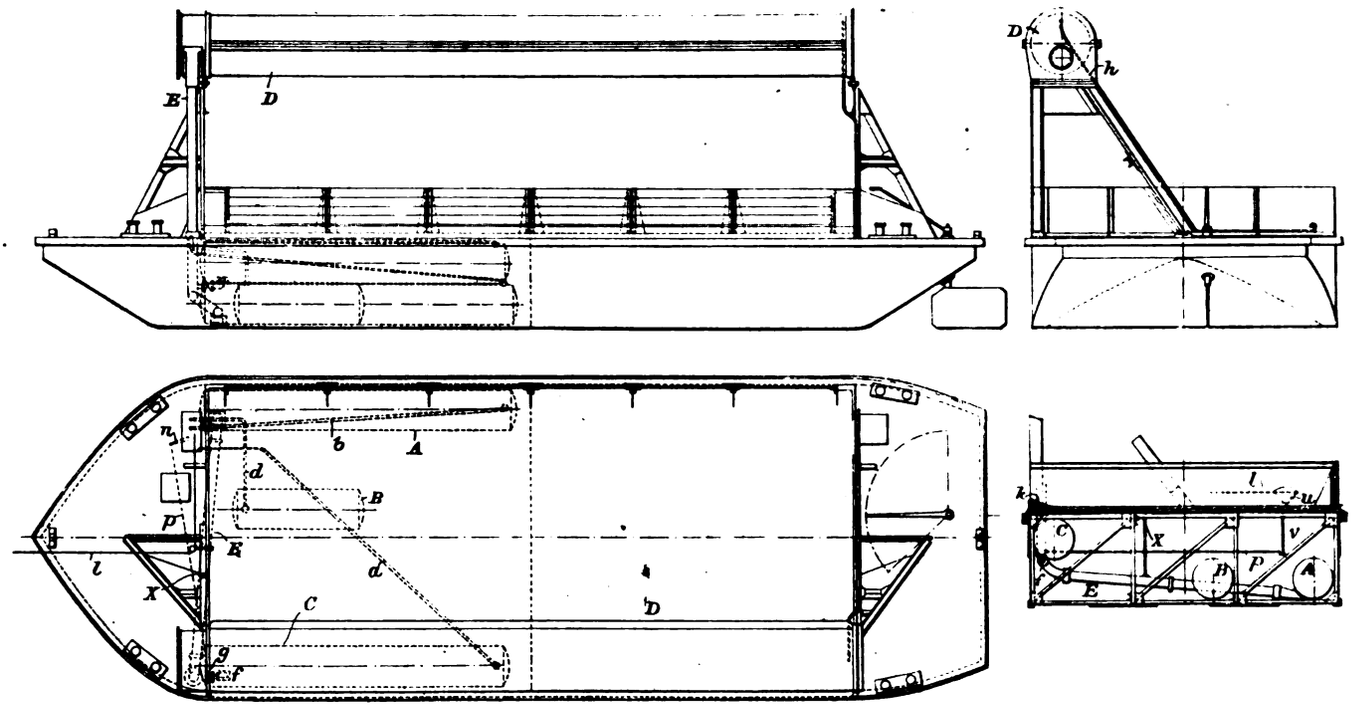


FIG. 3—WATER CONTROL SYSTEM. WIKING SELF-DUMPING BARGE.

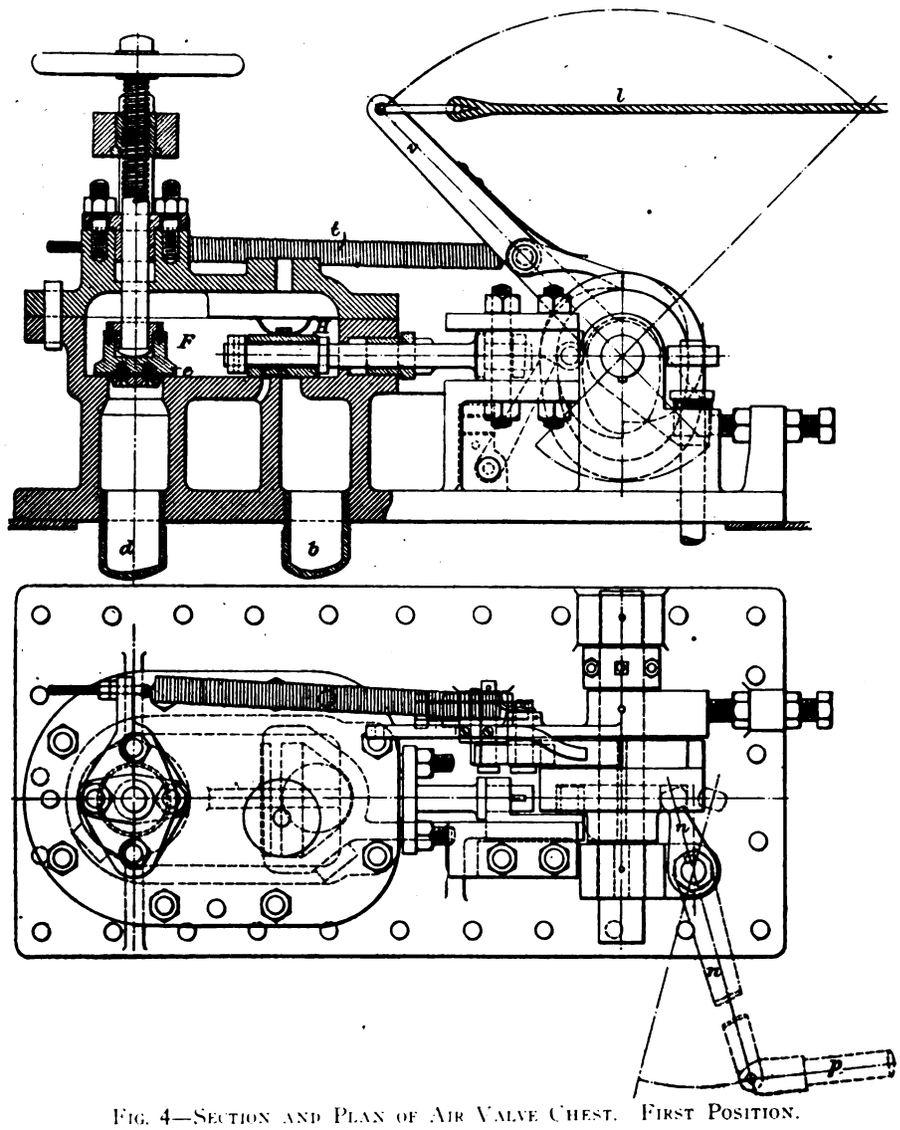


FIG. 4—SECTION AND PLAN OF AIR VALVE CHEST. FIRST POSITION.

slide-valve when it is desired to dump. This rope is carried to the tug which is towing the barge. When the barge takes up an extreme position while dumping, as explained above, it is necessary to interconnect tanks *D* and *C*. This is done by opening the valve *g*, which may be seen in Fig. 3. The valve is operated by a rod connecting from the lever *n* on the slide-valve gear as shown in Fig. 4.

The arrangement of the valve-operating mechanism will be seen in Figs. 4 and 5. The cross-head of the slide-valve rod is fitted with a pin and roller, which work in the grooved path of a cam carried by the operating-lever spindle. One side of the cam is formed with four ratchet-teeth, which are acted on by a pawl pivoted on the operating lever, in such a way that as the lever is pulled forward through 90 degrees into the position indicated by the dotted center-line in Fig. 4, the cam will also be rotated through 90 degrees. In addition to operating the slide-valve, the grooved cam is also arranged to control the position of the lever *n*, which is connected to valve *g*. The short end of the lever is formed with a spherical bearing surface which lies in the cam groove in such relation that the lever is swung through an arc of about 30 degrees by the variation in the radius of the groove. The arrangement will be understood from Figs. 4 and 5.

At the commencement of the cycle of operations the apparatus will stand as shown in Fig. 4, except that stop-

valve *e* will be open, admitting compressed air to the valve-chamber. When it is desired to tip the barge, the rope *l* is given a first pull. This causes the apparatus to take up the position shown in Fig. 5, the slide-valve then admitting compressed air to pipe *b*, and so to tank *A*. The lever *n* is unaffected by this first movement. When the rope is released, the operating lever returns under the action of the spiral spring, without any further movement of the cam. It will now be clear that a second pull on the rope, rotating the cam through a further 90 degrees, will return the apparatus to its original position, as shown in Fig.

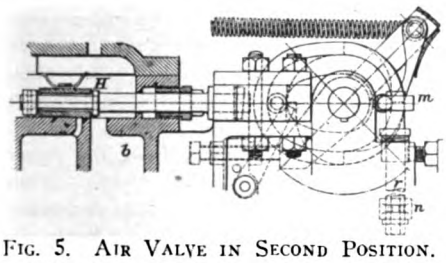


FIG. 5. AIR VALVE IN SECOND POSITION.

4, with the exception that the cam will be turned through 180 degrees from the position shown. If, owing to the nature of the load, the barge has dumped without the level of tank *D* falling below that of *A*, these two pulls on the rope *l* will have completed the operation, and the barge may be returned to harbor for a fresh load; but if it is necessary to admit water to tank *C*, as before explained, a third pull is given to the rope. Owing to the position of the cam, this third pull does not affect the slide-valve, but causes a movement of lever *n*, which opens the valve *g*, so that the barge gradually rights, as previously explained. A fourth pull on the rope restores matters to the position shown in Fig. 4.

The tank *B* is supplied with compressed air at about 100 lbs. pressure, and is charged by coupling a hose to the top of the valve-chest. Tank *A* requires about 6 tons of water for every 200 tons of load on deck. The barge illustrated has been supplied to Stockholm, and was designed and constructed by A. F. Wiking, of Stockholm.

PROPOSED 600,000-HORSEPOWER HYDRO-ELECTRIC PLANT.

According to the *Canadian Electrical News,* the Long Sault Development Co., in conjunction with the St. Lawrence Power Co., proposes, if its scheme is approved at Ottawa, to build a 4,500-ft. dam, 45 ft. high, across the St. Lawrence river at the head of the Long Sault rapids, and to build an electric plant to develop 600,000 horsepower. The project is favored by the towns and municipalities in the vicinity, which hope to profit by cheap power. Opposition is being raised by the Ontario government, the Conservation Committee at Ottawa, and various other bodies, who see in the proposal a possibility of an encroachment on Canadian resources for the development of United States enterprises. It is also feared that the navigability of the river may be affected by the diversion of so great a quantity of water. The latter objection, however, is met, for the companies, by a promise to provide a new ship channel of ample proportions on the south side of the river. Apparently almost unlimited capital is behind the scheme, which is planned to cost in the neighborhood of $20,000,000.

NEW FIRE BOAT FOR CITY OF BALTIMORE.

The city of Baltimore has decided to add to its floating fire-fighting equipment a powerful fire boat and has commissioned Babcock & Penton, engineers and naval architects, Cleveland and New York, to furnish designs and specifications and to superintend construction. The outboard profile and deck plan of the approved design is presented herewith and THE REVIEW hopes to present complete plans later. The dimensions decided upon are: Length over all, 120 ft.; between perpendiculars, 109 ft. 6 in.; beam, molded, 28 ft.; depth, molded, 15 ft.; draught, 10 ft. The construction will be of steel throughout, with no exterior wood work. As will be seen the deck erections are limited to a boiler house with pilot house above. The fire pumps comprise two turbine driven centrifugal pumps which have a capacity of 4,500 gallons of water per minute against a pressure of 150 lb., or a combined capacity of 4,500 gallons per minute at 300 lb. pressure, operating in series at the same speed. The monitors and hose connections are arranged as follows: On deck immediately above the pumps will be fitted a turret with 12 3-in. hose valves, and from the top of this turret a connection is extended to a monitor platform immediately above on which is located a 4-in. monitor nozzle. On deck forward is located another turret having four 3-in. hose valves and one 4-in. monitor nozzle above. This turret also has on the forward side four 6-in. hose valves for shore leads for connection to fire mains. An 8-in. branch from the forward line, which is 12-in. diameter, leads to the top of pilot house to a third monitor. A fourth monitor is located about 30 ft. above the after deck on a lattice work mast with a platform at the top. The propelling engines are double simple non-condensing, 20 x 20- in., driving a solid four-bladed steel propeller.

There are two surface condensers, one for each turbine, with independent circulating and air pumps. An atmospheric exhaust disabling pipe, common to both turbine sets, is also fitted.

There are two boilers, set abreast, 12 ft. 6 in. diameter, 11 ft. 6 in. long, built for a working pressure of 170 lb., containing two removable type corrugated furnaces. The boilers will be fitted with mechanical heated draft and a branch from the propelling engine exhaust line is also led into the base of the stack above the air heaters to assist draft in getting away from the dock. The coal bunker is located immediately forward of the stoke hold.

The shell plating is reinforced forward for working in ice. A steam steering gear of pilot-house type, is fitted and arranged to be worked by hand when necessary. A 10-kilowatt electric lighting plant is located in the engine room with an 18-in. search light on pilot house.

Proposals are now being received from ship builders and the contract will probably be placed at an early date.

HEFFERNAN TO BUILD SHIP REPAIR PLANT AT SEATTLE.

By the purchase of 18 acres of Seattle tide lands recently, J. T. Heffernan, president of the Heffernan Engine Works, and Heffernan Dry Dock Co., Seattle, becomes the owner of 35 acres in one tract having a deep water frontage of 3,600 ft. On this site Mr. Heffernan and his associates have announced that they will erect a large shipbuilding and repair plant in the near future. The Heffernan Dry Dock Co.'s 6,000-ton floating dry dock is now in operation at the site of the new plant. The new construction contemplated consists of machine shops, foundry, ship fitting shops, joiner shops, etc., including all the necessary equipment for a ship repair plant, employing from 1,000 to 1,200 men when working at full capacity.

The Northern Navigation Co. have appointed Brock Batten as general agent at Port Arthur and Fort William. Mr. Batten succeeds R. Beaumont, who has occupied the position since last September.

In Behalf of the American Marine

THE Committee of One Hundred of the National Association of Manufacturers of the Merchant Marine, listened to spirited speeches from distinguished speakers in behalf of the merchant marine, at a dinner given at Hotel Knickerbocker, New York, on March 14. D. A. Tompkins, of Charlotte, N. C., was toastmaster.

Congressman W. E. Humphrey, of Washington, the leader in the movement to restore the American flag to the seas, said in opening his address that he had an interview with President Taft the preceding Sunday, in which the chief magistrate said:

"Give my compliments to the great organization that you represent and tell them that the work has my interest. I think it is one of the greatest questions before the American people today, and I will do all in my power to bring about the establishment of our mercantile marine."

"Both on the Atlantic and the Pacific," Mr. Humphrey went on, "are foreign trusts preying on American commerce. On the Pacific ocean is the Ship Owners' International Union, representing more than 1,300,000 tons—practically all the foreign sail tonnage on the Pacific ocean. It is composed of English, German and French ships.

"Its declared purpose is to raise freight rates from American ports. Immediately after its formation rates on the Pacific were advanced more than 400 per cent. The freight on a ton of wheat from Seattle to Europe was raised from $1.25 a ton to $5.62, and now is $6.90 a ton. This summer ships carried to Seattle freight from Europe for $1.25 a ton, but refused to take a return cargo for less than $6.90, and sailed away in ballast.

"On the Atlantic ocean there is another combination of foreign ships, and there is yet another preying on our commerce with South America. These two combinations pool issues and divide the spoils. Not only has the Hamburg-American Packet Co., which controls our carrying trade to Europe, raised freight rates, but, according to the complaints filed with the Inter-State Commerce Commission, it tells the American merchant when he shall send his goods, how he shall send them, upon what ship he shall send them, and what amount he shall send. If any house violates these demands, it is boycotted and, if possible, driven out of business.

"There is not a more exacting trust than the combination of foreign vessels plying between here and South America. It is dictated by the English firm of Lamport & Holt. It resorts to rebates, discriminations and boycotts. It has actually compelled American ships to return from South America in ballast. Even if they offer to carry American goods for nothing they cannot get a cargo. Our Ambassador in Brazil gives an illustration of a firm of coffee merchants being compelled to refuse to give a cargo of coffee to a ship already in the harbor, although it offered to carry such cargo for just one-half the rates charged by the combine.

"The controlling spirit of these two combinations that work together for a common purpose is Herr Ballin, of Hamburg, Germany. A short time ago the representatives of these combinations met in Europe, with Herr Ballin as their guiding genius, and raised freight rates between the United States and Europe 50 per cent. This is the same Herr Ballin whose company, when complaint was filed against it before the Inter-State Commerce Commission for rebating and boycotting, made reply that it was beyond the jurisdiction of the American courts, and would take such action in these matters as it saw fit. This is the same Herr Ballin whose company, when war was declared with Spain, voluntarily withdrew two of its fastest and best vessels and sold them to Spain 'to sink, burn and destroy' American commerce.

"These trusts of foreign ships are today doing the same thing for which domestic corporations have been dissolved and fined. If these corporations were today within the jurisdiction of our courts as are our domestic corporations, we would have their representatives on their way to the penitentiary inside of 90 days. But these trusts are beyond our laws; we have no way to control them.

"The military side of the question is more alarming still. According to the War Department we need for the use of the army in case of war 228 merchant ships of various kinds. If we were to face an emergency today, we could not furnish 20 vessels suitable for war purposes. We are in a worse condition today than when war was declared with Spain. Then it took us 20 days to get a sufficient number of vessels to carry 10,000 men to Cuba. These old, antiquated vessels cost us, when ready for this trip, $13,000,000. Even then they were totally unsuited for this purpose and exposed our troops to greatest peril.

"Our next contest will be upon the Pacific. We are as helpless today on that ocean as was Russia. Japan today has 550 vessels fit for transports. The United States has on the Pacific six merchant vessels and four or five antiquated government transports. Japan can easily carry 200,000 troops at one time; on the Pacific we could not carry 10,000. Japan could place 250,000 troops in the Philippines in 30 days, and 100,000 in Hawaii in the same time. We could not get 10,000 troops ready to embark from any point upon the Pacific coast in 30 days. If we had transports we would not dare attempt to take them to our island possessions, for we have nothing but cruisers to meet the battleships of Japan."

Henry Clews gave figures of the decline of American shipping. Only about 9 per cent of the imports and exports of the United States, he said, are now being carried in vessels flying the American flag. In 1826, the amount carried was 92 per cent. Of 423 steamships sailing recently from New York for foreign ports only 28 (or about 7 per cent) carried the American flag; 265 sailed for European ports, only six of which were built in American yards; 71 were bound for ports in Cuba, the West Indies, and Mexico, but only 22 of these were of American registry. The American merchant tonnage registered for foreign trade in 1900 was 836,229, while the population was 75,000,000. When the population was only 7,000,000, in 1810, we registered a tonnage of 981,019.

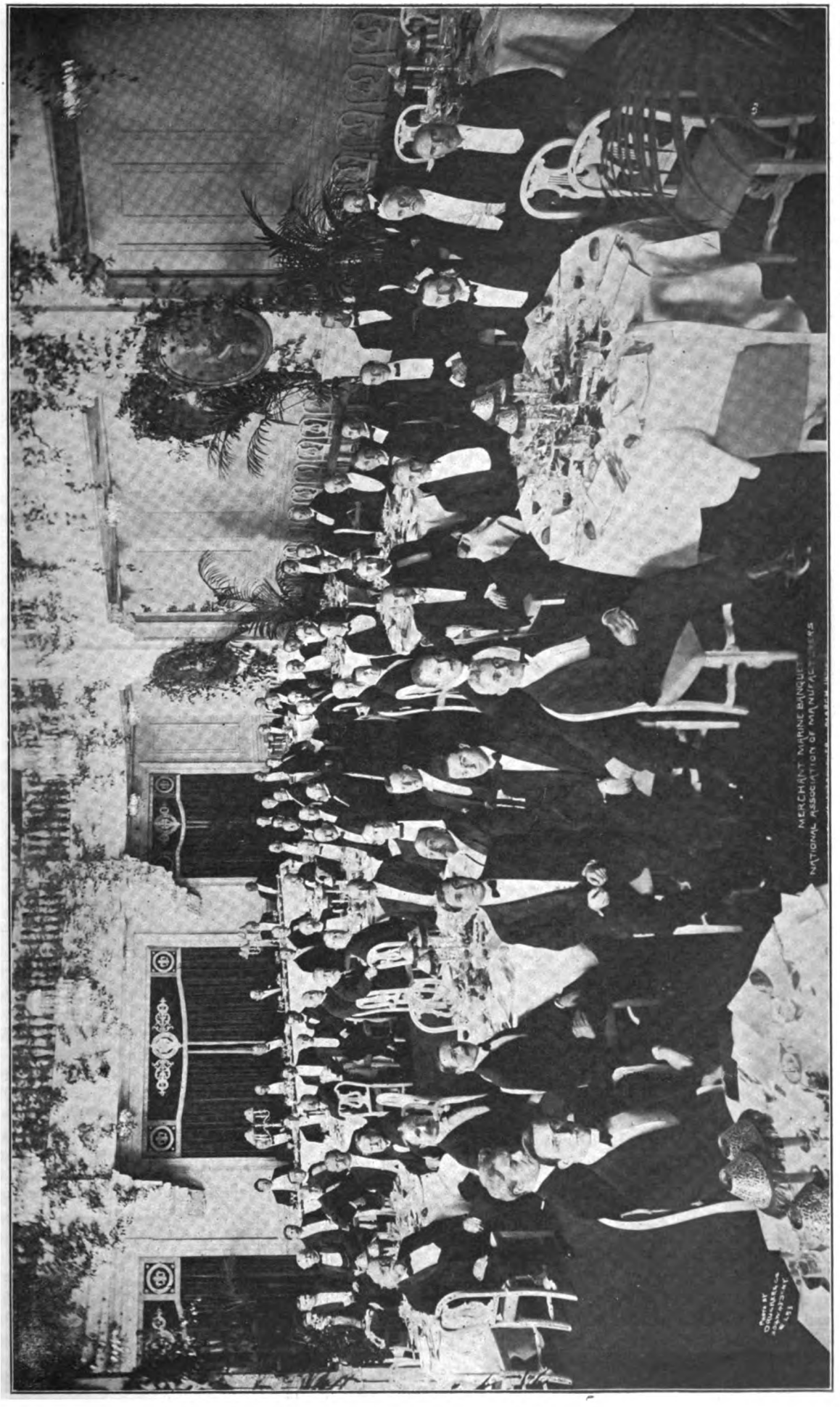
"The first step," went on Mr. Clews, "to be taken toward the restoration of American shipping is to convince Congress of the necessity of removing the handicap placed upon it at the time of the civil war, by forbidding the transfer of foreign-built ships to American registry, even when owned by Americans.

"This practical embargo should be promptly superseded by a law permitting foreign-built ships to receive registers here, when owned by Americans, and we would soon be flying the American flag all over the world, and share largely in the world's carrying trade.

"The principle of protection cannot be made to work at sea. Unfortunately, American ships cost more to build and run that any others in the world. This, gentlemen, is the real reason why our merchant marine is disappointing; this is the crux of the whole question.

"We must secure our ships and our sailors on the best terms possible. That is the foundation of England's extraordinary success. She buys her ships, her supplies, and her labor in the cheapest market. So must we. If a ship costs $1,000,000 here and $750,000 abroad, we must buy abroad."

As Mr. Clews said this, loud cries of



BANQUET OF THE COMMITTEE OF ONE HUNDRED OF THE NATIONAL ASSOCIATION OF MANUFACTURERS OF THE MERCHANT MARINE AT HOTEL KNICKERBOCKER, NEW YORK, MARCH 14.

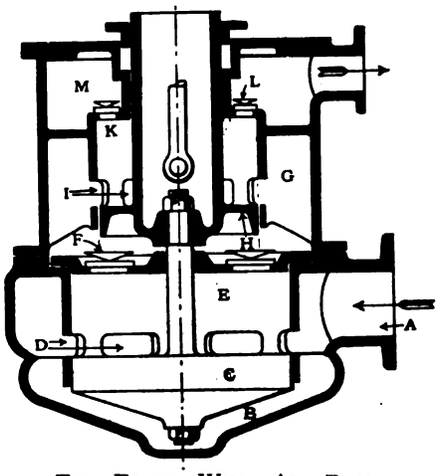
dissent were raised from all over the room.

John Barrett, director of the international bureau of American Republics, urged that the trade of the Argentine alone had doubled in ten years, and was still increasing by leaps and bounds. The United States, he said, was flirting with Europe, flirting with the Orient, and sitting in cozy corners with Germany and Japan, but letting, as it were, our sister nations of South America be wallflowers.

Ex-Congressman James Watson begged to differ with the remarks of Mr. Clews that it was the wisest policy for America to buy her ships abroad. England is a free trader in everything but her shipping, he said, and America protectionist in everything but her shipping. That was the difference.

A NEW DESIGN OF AIR PUMP.

One of the undesirabble features of the ordinary design of wet air pump is the great difference in pressure on the delivery valves and which is during a part of the stroke equal to the total delivery head plus the highest vacuum



THE ESCHER-WYSS AIR PUMP.

and is still to be reckoned with even in two-stage pumps. Three-stage pumps have been proposed with a view of mitigating this difficulty, but other disadvantages involved in the design such as high cost of construction and maintenance and greater frictional losses have prevented their adoption and the ordinary single-acting, single-stage bucket type of pump has maintained its supremacy for marine work.

A new design, which is illustrated herewith, has been recently introduced by the eminent Swiss Engineering firm of Escher Wyss & Co., Zurich, which combines the simplicity of a two-stage pump with the advantages of one having three stages. The pump is of the vertical type and the air and the water of condensation enter the suction space *B* together through the branch *A*.

The piston *C* uncovers the lower suction ports *D* during the latter portion of its downward stroke so that the air can enter the space *E* above the piston and at the same time displaces the water of condensation collected in the lower part of the space *B* and by reason of the form of the chamber walls projects it through the ports *D* into the space *E*. In these respects it will be seen that the pump follows the well known Edwards form of construction.

On its upstroke the piston *C* closes the ports *D* and cuts off communication between the spaces *E* and *B* and compresses the air in the space *E* above the piston. Meantime, however, the piston *H* will also have closed the ports *I*, cutting off communication between the spaces *G* and *K*. The air left in the space *G* from the previous cycle, therefore, expands due to the upward movement of *H* and its pressure falls, while the pressure in the space *E* increases.

The pressures in spaces *G* and *E* therefore quickly reach an equilibrium allowing the valves *F* to open easily, and from this point to the end of the upward stroke the spaces *E* and *G* form a common chamber. Owing to the fact that the displacement of piston *C* is greater than piston *H* the expansion in the space *G* ceases and compression begins and the air in the spaces *E* and *G* is simultaneously and uniformly compressed. Towards the end of the upstroke of course the water of condensation above the piston *C* is forced through the valve ports *F* into the space *G*.

When the piston *H* has closed the ports *I*, compression begins in the space *K* and proceeds until the pressure is great enough to open the discharge valves *L* to the space *M* and during the last portion of the upstroke the water of condensation above the piston *H* is also forced through the valves *L* into the space *M*.

At the upper dead point both the upper valves *L* and the lower valves *F* close and with the reversal of movement expansion begins in the spaces *E* and *K*, each of which now forms a separate closed chamber, while compression begins in the space *G*. When the descending piston *H* opens the ports *I*, the spaces *G* and *K* are put in communication, consequently creating equilibrium of pressure. Continuing its downward movement into the common space *K-G* the piston *H*, due to its trunk construction, compresses the air until the pistons have reached their lowest position. At this point there exists in the space *G* the greatest pressure that obtains during the entire cycle. Such maximum pressure is, however, far less than the delivery pressure in the space *M*. The difference in the pressure on the valves *F* is accordingly not nearly so great as if the valves *L* did not exist. There thus exist three quite different pressures in the spaces *E*, *G* and *M*, and although this pump has only two sets of suction ports *D* and *I*, and two sets of delivery valves, *F* and *L*, it is, in effect, a three-stage pump, and its valves are relieved in the best possible manner. In its whole construction, however, the improved pump has the simplicity of the two-stage pump, and it is reported that it works absolutely noiselessly at speeds of 200 R. P. M. and upwards and with small power consumption.

WHITE STAR LINERS OLYMPIC AND TITANIC.

The construction of these two vessels by Messrs. Harland and Wolff at Belfast, continue to be of public interest, the warrant for which is the fact that no steamers have yet been built that will be able to approach them in size or for their luxurious appointments.

The Olympic, the first to be laid down, is making remarkable progress, and, although such unique structures must necessarily require long periods for the execution of the work at the various stages of construction, so complete is the organization of the builders that it is understood the launching date is already fixed for Oct. 20 next. The vessel is already more than half plated and riveted, and a view of the hull gives a very true impression of the progress that has been made, as the internal work of construction has also proceeded rapidly and simultaneously; several of the principal decks, such as the lower, middle, upper and saloon decks, are already plated, and the plating of the other decks is proceeding, also the construction of the partitions and houses on some of the decks. The engine and boiler casings are well advanced, also the engine seating.

The work on the Titanic is also proceeding apace, the stern frame being now in position, and the construction of these two vessels side by side, the two representing something like 120,000 tons displacement, is a record in shipbuilding, which speaks volumes for the enterprise of the White Star Line. It also affords evidence of the development of commerce and intercourse between the two hemispheres. This enterprise of the White Star company will not only secure to Atlantic travelers ideal conditions for crossing the ocean, but also insure the continued supremacy of British shipping.

NEW SHEAR LEGS AT UNION IRON WORKS CO., SAN FRANCISCO.

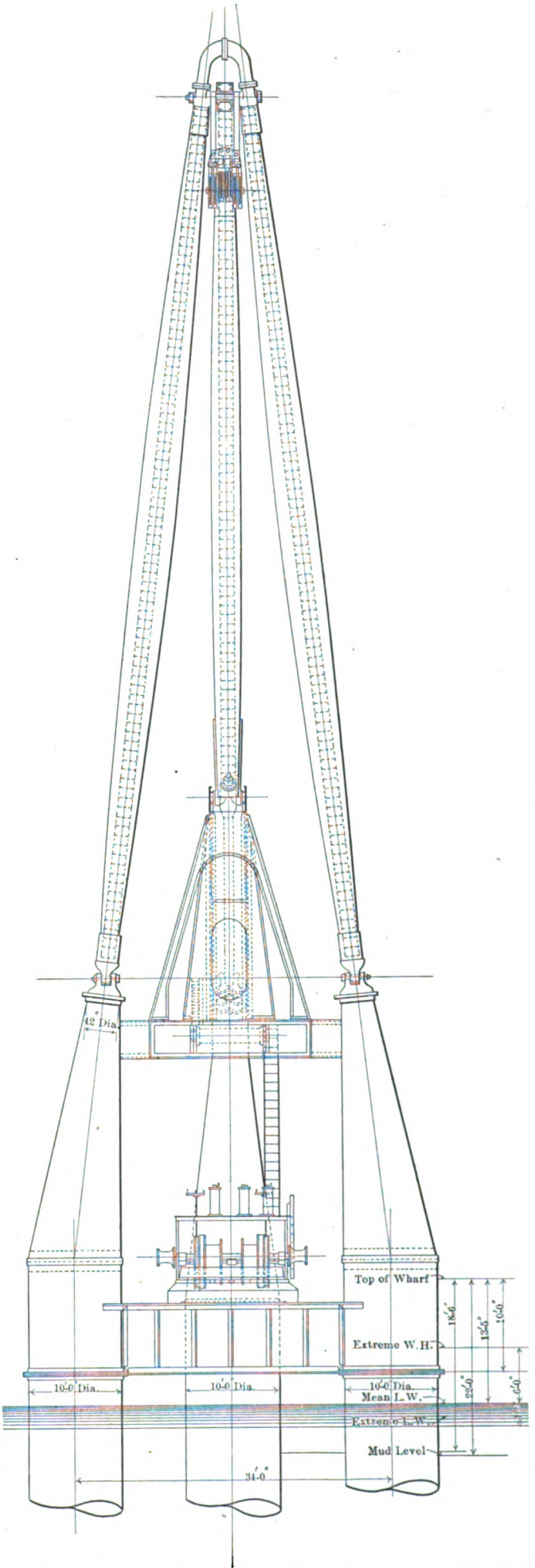
AMONG the numerous structures that suffered damage by the earthquake and fire which visited San Francisco in April, 1906, leaving behind a trail of wreck and ruin having no parallel in modern times, were the heavy shear legs at the plant of the Union Iron Works Co., at Portrero, San Francisco. The legs were thrown from their foundations and so badly damaged that it was decided to entirely renew the structure from the foundations up.

By courtesy of the Union Iron Works Co., we are enabled to present herewith a halftone and line engravings of the new legs, which were designed by Hugo P. Frear, superintendent of hull construction for the company, and erected under his supervision. Since their completion they have been subjected to a number of full load capacity tests and have proven entirely satisfactory.

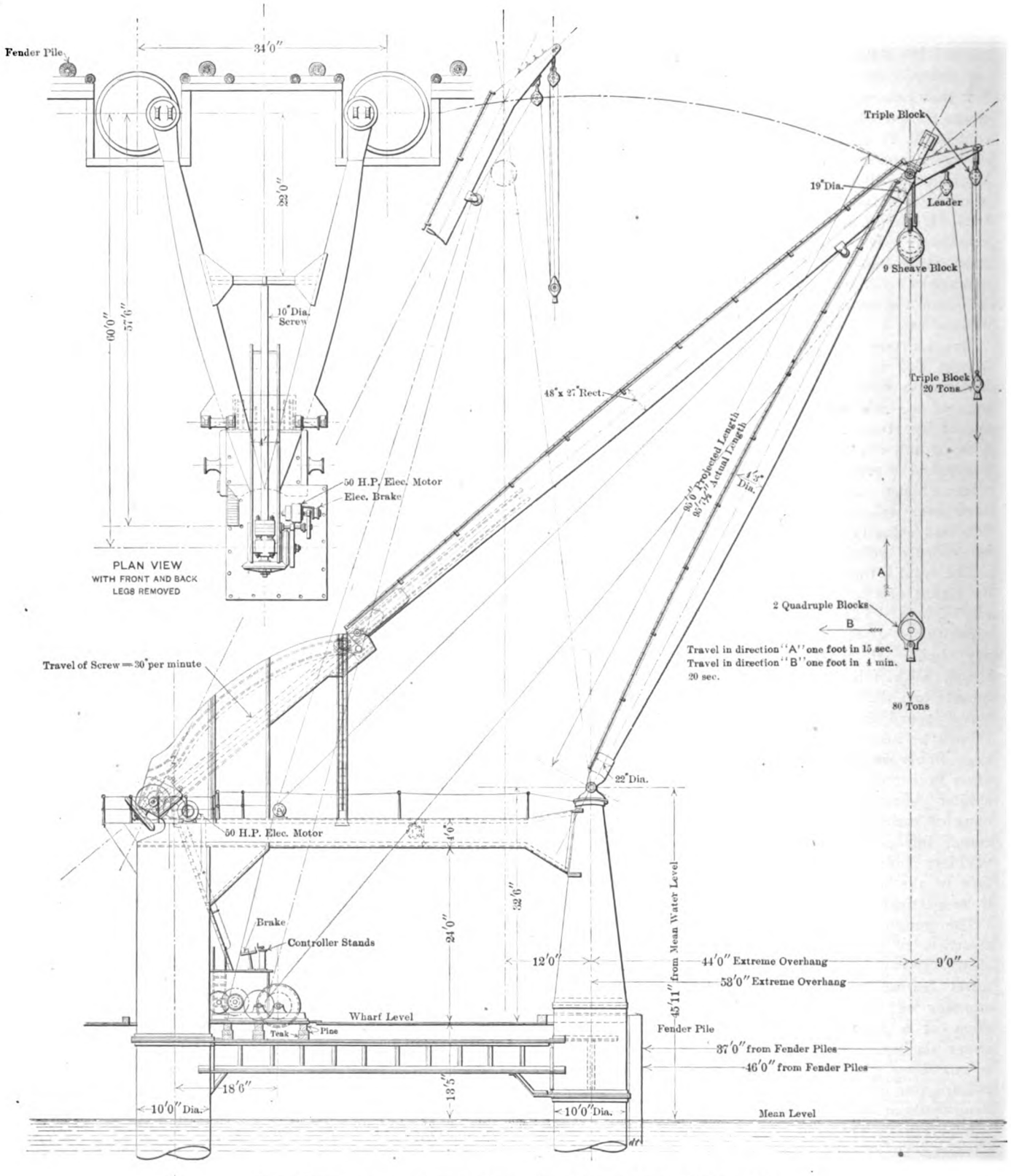
The total lifting capacity is 100 tons, by means of two hoists, each electrically driven. The main hoist has a capacity of 80 tons and the auxiliary hoist 20 tons. The hoisting speed, with full load, is 4 ft. per minute and the racking, or horizontal, travel speed is 0.23 ft. per minute. It will be seen that these speeds are exceedingly moderate compared with other recent examples of shear legs of similar capacity. The extreme overhang of main hoist is 44 ft. from the center line of front piers and of the auxiliary hoist 53 ft., and from the face of the fender piles 37 ft. and 46 ft. respectively.

The general arrangement and construction of the shear legs are very clearly shown in the illustrations. A novel feature of the design is the stepping of the front legs on steel piers at a height of about 46 ft. above the mean water line and 32 ft. 6 in. above the wharf level. This construction allows of a large overhang without excessive length, but it will be readily observed that the chief advantage lies in the ability to reach well beyond the midship line of a large ship without resorting to crotching out from the wharf, as is frequently the case with high-sided ships where the legs are stepped directly at the wharf level. The halftone shows the legs placing a spar in steamship Mexican immediately after launching, with a free board of about 40 ft.

The foundation consists of three cylindrical steel sheathed piers, each 10 ft. diameter. Each front pier rests on twenty 80-ft. fir piles and



FRONT ELEVATION OF SHEAR LEGS FOR UNION IRON WORKS CO.



SIDE ELEVATION OF SHEAR LEGS FOR UNION IRON WORKS CO.

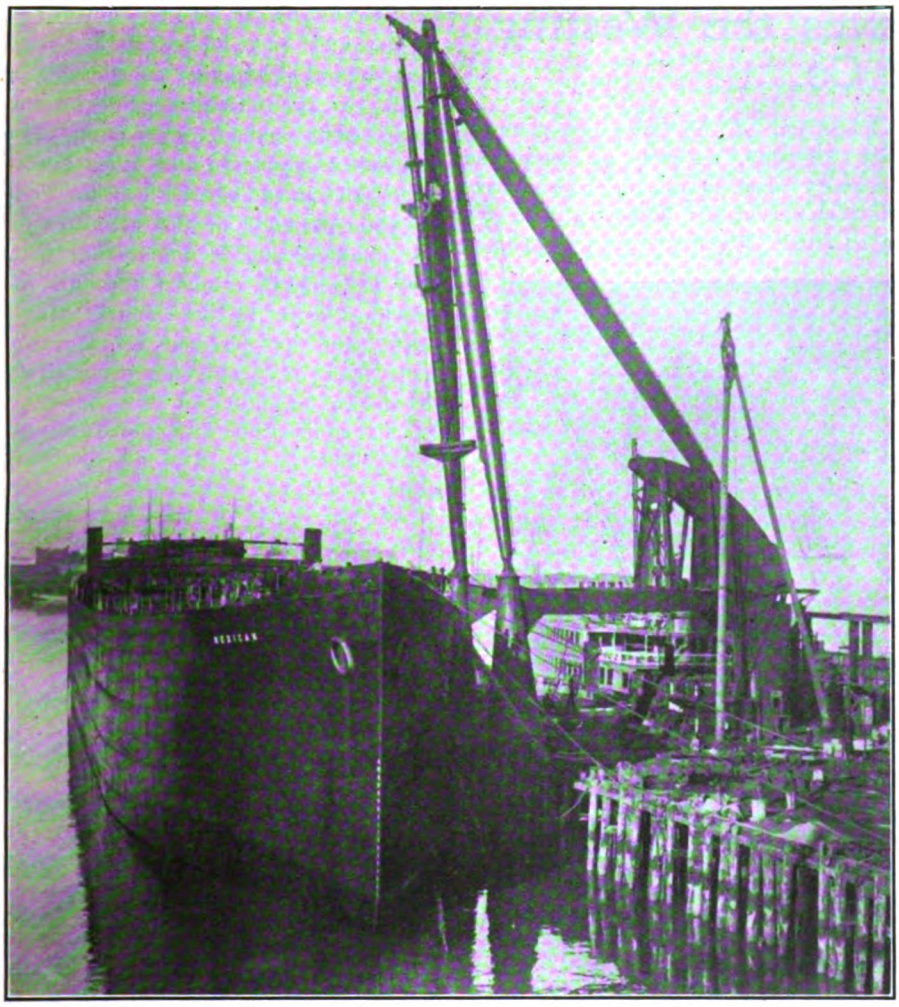
the back piers on sixteen 80-ft. piles. The piers are carried to a point 29 ft. above the wharf level and are tied together at the top by plate girders.

The leading general dimensions are clearly shown in the line engravings.

The racking movement is effected by means of a screw working in a nut in the lower end of the back leg and connected through spur and bevel gearing to a 50 horsepower electric motor. The peripheral speed of the screw is 30 in. per minute. All movements are controlled from a platform located in front of the back pier and immediately above the hoisting mechanism.

PURCHASE OF STEAMER ALAMEDA.

The Alaska Steamship Co., of Seattle, bought the steamship Alameda from the Oceanic Steamship Co., of San Francisco, recently, and will operate her on the Alaska run, starting the latter part of April, in place of the Victoria, which will go on the



SHEAR LEGS AT UNION IRON WORKS, PLACING SPAR IN STEAMER MEXICAN

Nome run this summer. Dispatches from San Francisco state that the purchase price was $275,000, but no confirmation of this statement can be obtained locally. General Manager Frank E. Burns and Supt. Eng. J. W. Pearson, of the Alaska Steamship Co., are in San Francisco and attended to the negotiations and inspection.

The Alameda has been for years employed on the run from Honolulu to San Francisco, and was one of the most popular freight and passenger vessels of the line. She is of 3,158 gross and 1,939 net tons, and is a product of the Cramp shipbuilding yards at Philadelphia. The Alameda is especially adapted to the Alaska run, as her iron hull, constructed in 1883, is more heavily plated than any of the vessels of her size and type now being built.

Vessel Burns Oil.

She is a single screw vessel, burning oil, and has a storage capacity for at least thirty days fuel at an average speed of twelve knots an hour. The vessel easily can make sixteen knots an hour, although her regular speed is less than that figure. She has triple expansion engines, the cylinders being 29 inches, 47 inches and 78 inches in diameter, with a 51-inch stroke. She has all two-berth rooms, with accommodation for 96 first-class passengers outside the settees. Including the settees she will accommodate 115 cabin passengers. She will also handle 27 intermediate passengers and has permanent quarters for 60 steerage, with room in the 'tween decks to extend the accommodations to an unlimited number by taking from the cargo space.

The Alaska Steamship Co. recently chartered the freighter Riverside from the Charles Nelson Co., of San Francisco, to take the place of the Olympia on the Valdez run when the latter shifts to the Nome run this summer. The Riverside will be taken over by The Alaska Steamship Co. April 15.

REPAIR WORK BY PUGET SOUND SHIPYARDS.

The Moran Co., Seattle, is well along on the construction of a new single screw steel freight steamer, to be used in the Alaska trade by the Alaska Steamship Co. as a sister ship to the Riverside, Falcon and Stanley Dollar. It will be completed and ready for service about September 1. A single screw steel passenger steamer for the Straits Steamship Co., to be run on the straits, is under way and will be completed August 1. Two submarine torpedo boats are being built by the Moran company for the government.

In repairs and overhauling, the Moran company has the United States coast and geodetic survey steamer McArthur, which is receiving a general overhauling of hull and machinery, preparatory to taking up her summer work. The Matson Navigation Co.'s steamer Hyades has just left the drydocks after an extensive overhauling, and the steam schooner Delhi is in to receive her annual repairs. The steamship Vashonian, and the Meta Nelson and Fanny Dutard have just been docked for a general overhauling.

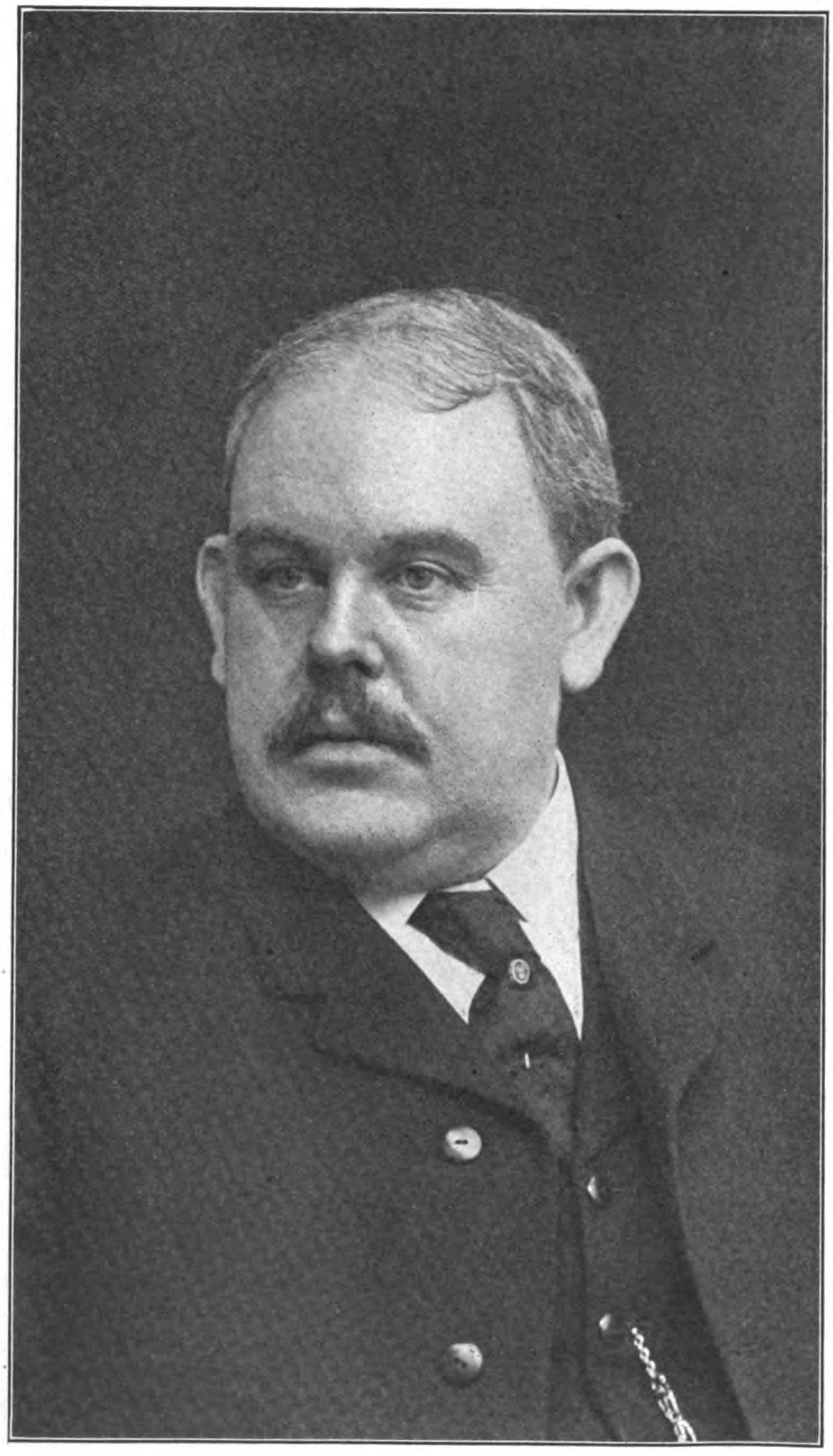
The season has been a busy one for the Heffernan Engine Works and Drydock, Seattle. The steamer Edith started on her way out recently with a new wheel and shafting, and the steamer Portland will soon be docked for her semi-annual overhauling. The steamer Ella, of the Jebsen line, is on her way up from San Francisco for extensive overhauling. The steamer Victoria will be in in about 15 days for her annual spring overhauling. The steamer City of Seattle has just left the ways at the Heffernan dock and is ready for the summer's excursion business to Alaska.

Hall Bros., at Eagle Harbor, Wash., while having no construction work this season, have overhauled and repaired the St. Paul, J. D. Peters, Harvester, Guy C. Goss and Benjamin F. Packard, for the Northwestern Fisheries Co., and are now at work on the revenue cutter Rush, bark Fresno and steamer Gedney, and have work ahead for more than a month after a busy season. More overhauling and repairing is now under contemplation.

The Canadian Pacific liner, Princess Charlotte, recently underwent a speed trial near Victoria, B. C. The run lasted six hours and when the tide was with the liner there were some top speeds clipped off. The mean average of the whole six hours was well over twenty knots an hour, showing that the fine new liner is all that was claimed for her, a good twenty knot steamer.

Mr. McFarland Leaves the Westinghouse Co.

WALTER M. McFarland, who has been associated with the Westinghouse Electric & Mfg. Co. since Jan. 1, 1899, has resigned to accept an official position with the Babcock & Wilcox Co. Mr. McFarland has occupied the office of acting vice president for the Westinghouse Electric & Mfg. Co. for a period extending over ten years. In this capacity he has had official supervision of the large contracts of the company, as well as being the advisory head in all the co-operative movements of the company with the associated Westinghouse companies involving literature, advertising and exhibition work.



MR. WALTER M. MCFARLAND.

As a frequent representative of the Westinghouse companies at important meetings of engineering societies and at conventions, he is well known, and he has long been looked upon, by his company at Pittsburg, as the official host. In the latter capacity he has come into contact with many distinguished engineers and other guests from all parts of the world. His broad experience in the activities of his company and in engineering matters in general, attained through his previous work in the United States navy, and his personal acquaintance with men of public affairs, entirely fitted him for duties of this character. In his connection with the Westinghouse Electric & Mfg. Co. he has done much to systematize and improve the work of the departments with which he has come into contact and has through his personal qualities won the confidence and respect of the large number of employees looking to him for guidance and direction.

Mr. McFarland was born in Washington, D. C., in 1859. His education was received in the public schools of Washington, the preparatory department of Columbia university and the United States Naval Academy. He entered the latter institution as a cadet engineer in 1875, and in 1879 was graduated second in his class. In 1881 he was commissioned as assistant engineer; in 1891 as past assistant engineer, and in 1898 as chief engineer. He was the youngest officer for more than 20 years to have reached the latter grade. When the "Personal Board" was assembled by the secretary of the navy in 1897, Mr. McFarland had the honor of acting as the sole sponsor for the younger men of his corps. From the first he was one of the most active and effective supporters of the amalgamation scheme, the recommendation of which was the result of the deliberation of the Board. As a member of the Board, he had the special confidence of its presiding officer, Theodore Roosevelt, then assistant secretary of the navy, and he proved a powerful advocate of the measure before the congressional committee; drawing from them the comment that he was the best posted man that they had ever examined. In 1899, after the passage of the "Personnel Bill," he was commissioned lieutenant, and the same year resigned to enter the employ of the Westinghouse Electric & Mfg. Co.

After having had wide experience in sea service, he was detailed for service in the Bureau of Steam Engineering in 1882. From 1883 to 1885 he was

detailed from the navy as assistant professor of mechanical engineering at Cornell university, and during the years 1885 and 1886 he was occupied with the inspection of machinery then building, and with work on preliminary design for proposed vessels. From 1889 to 1894 he was again attached to the Bureau of Steam Engineering.

This experience, together with his experience in the affairs of the Westinghouse Electric & Mfg. Co., admirably fit him for the duties which his connection with the Babcock & Wilcox Co. will impose upon him.

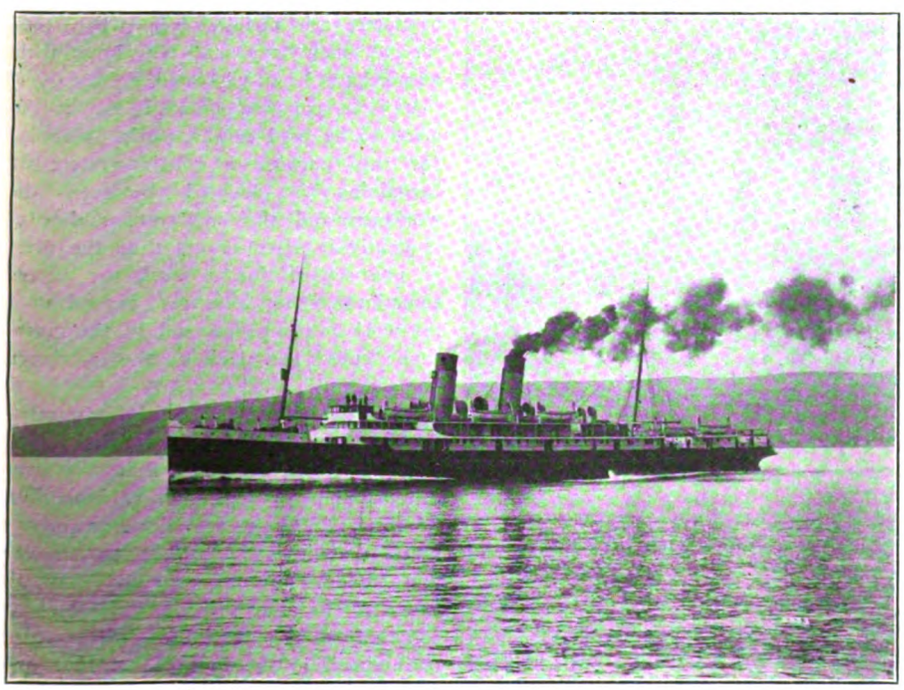
Mr. McFarland was vice president of the American Society of Mechanical Engineers in the year 1907, and at the present time is vice president of the Society of Naval Architects and Marine Engineers. He is also a member of the Engineers' Club of New York, Duquesne Club of Pittsburg, the Army and Navy Club of Washington, and the Army and Navy Club of New York.

He has been a frequent contributor to the technical press, and his papers on engineering topics have won for him an enviable reputation as an engineer of broad experience and advanced ideas.

Mr. McFarland will be located at the general offices of the Babcock & Wilcox Co. in the Singer Building, New York City.

New Queenborough and Flushing Mail Steamers

THE three new cross channel steamers of the Zeeland Steamship Co. of Flushing, Holland, are of an interesting type, and are certainly among the best equipped of any similarly engaged vessels afloat. They are twin-screw vessels, named "Prinses Juliana," "Oranje Nassau," and "Mecklenburg" and have been built by the Fairfield Shipbuilding & Engineering Co., Scotland. They will displace paddle-steamers which have hitherto carried on the Queenborough-Flushing service. So popular has the Flushing route become that it was felt that larger and swifter vessels were required, and designs were prepared for paddle steamers, twin-screw steamers, and turbine craft. It was finally decided to adopt reciprocating machinery and twin-screws as affording the best aggregate of the qualities of speed, absence of vibration, and maneuvering power. The contract for the new vessels stipulated for three steamers about 360 ft. in length, each having two sets of quadruple expansion, four crank balanced reciprocating engines, capable of driving the vessel at a mean speed of 21 knots over the 120 miles of shallow North Sea which lie between Queenborough and Flushing. Modern passenger steamers are often referred to as "floating hotels," or "palaces," but in no hotel is a guest expected to share his room with another traveler, and in the experience of the Zeeland Co., it was found that there was a steadily increasing demand for "a room to myself." In arranging the accommodation, therefore, special attention was given to obtaining as many single berth staterooms as possible, and in each ship there are no less than 64 one-berth cabins out of a total of 145. The vessels are each 363 ft. in length, over all, 45 ft. 4 in. in extreme width, and 25 ft. 10 in. depth to upper deck, and of about 3,000 tons gross. There are five decks—lower, main, upper, promenade, and boat deck, and ten water-tight bulkheads, extending to the height of the main deck. There are two funnels, which, with a fore and aft rig, give the vessels a smart appearance, as our illustration shows. Other features of these new ships are the provision of submarine signalling and wireless telegraph apparatus. The submarine signal receiver works in conjunction with submarine bell-sounding apparatus installed at Flushing harbor, and on the North Sea lightships, and enables the vessel to ascertain her true position and to enter the harbor with absolute safety and certainty in foggy weather. There is in each steamer accommodation for 244 first-class passengers, of whom 64 will have single berth, and the majority of others two-berth cabins. A separate group of two-berth cabins forward on the main deck is reserved for ladies, with a handsome sitting room and stewardess's cabin immediately adjacent. Aft there are berths for 110 second-class passengers in cabins for two, four, or six. The promenade deck, which is 195 ft. in length, forms a spacious promenade for passengers, while the boat-decks afford protection in inclement weather.

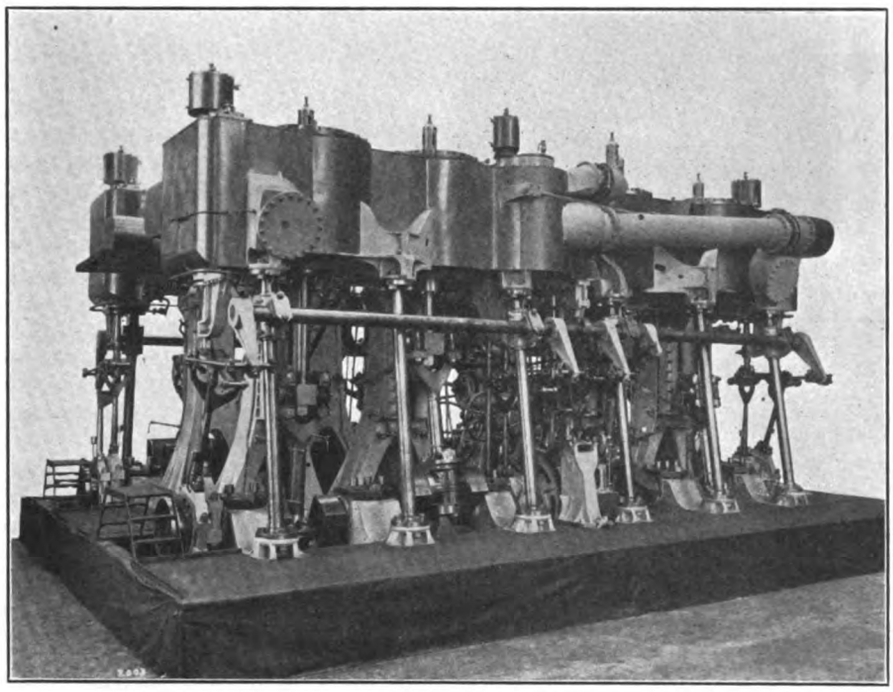


QUEENBOROUGH AND FLUSHING MAIL STEAMER ORANJE NASSAU STEAMING 22½ KNOTS.

The cargo capacity of these new vessels is, considering their passenger accommodations and speed, very large, and the outfit of powerful, silent winches and derricks, provided for handling this is remarkably efficient, and will undoubtedly make for rapid dispatch, which, in view of the perishable nature of much of the merchandise carried on this route, is a matter of much importance. Cargo is carried in holds both forward and aft, as well as in special spaces underneath the forecastle deck, where are also situated large and conveniently-arranged mail and baggage rooms, together with a complete postal-sorting

office. Safety appliances are provided on an ample scale, for, in addition to life-belts for each passenger, and eight life boats, the Zeeland company, foreseeing the difficulty of getting a life-boat into the water in case the ship had taken a considerable list either way, have devised and have fitted an arrangement of rails and trollies by means of which the life boats on either side can be taken to the davits on the other side, and thence launched into the water.

The twin-screws are each driven by a set of four-crank triple-expansion engines, balanced on the Garrow, Schlick and Tweedy system, each set of engines has one high pressure cylinder 28 in. in diameter; one intermediate cylinder, 43½ in. in diameter; and two low pressure cylinders each 49 in. in diameter, all arranged for a stroke of 2 ft. 9 in. All the cylinders are fitted with separate cast iron liners. The propellers are built up, the three blades on each are of manganese bronze, and the bosses of cast steel. On each set of engines there is a steam-driven reversing engine, with gear of the all-round type, and a separate steam-driven turning engine.



ENGINES OF THE ORANJE NASSAU.

On certain parts of the service route the water is shallow and the bottom sandy, and to prevent this sand, when stirred up by the propellers, finding its way into and damaging the stern tube bearings, a Cedervall's patent gland is fitted on each shaft between the aft flange of the stern tube and the forward face of the propeller boss. In this case the usual gun-metal liners on the propeller shaft, which run in lignum vitae bearings, are omitted, and the shaft, unlined, runs in stern-tube bearings lined with white metal, and the stern-tube is kept full of oil by means of a small pump fitted in the tunnel. There are four double-ended cylindrical boilers designed for a working pressure of 190 lb. per sq. in. Each is 14 ft. 6 in. mean diameter, and 20 ft. long with six corrugated furnaces. As it was of the utmost importance to minimize weight, the boilers have been constructed of special high-tensile steel, while all the machinery has been designed of as light a nature as possible, consistent with efficiency and strength.

On the measured mile on the Clyde, the "Oranje Nassau," as in the case of all the three steamers, attained a mean speed of over 22½ knots, while on the service runs in the North Sea, 22 knots,—or one sea mile per hour in excess of that contracted for,—was easily maintained for a period of six hours.

A newly revised edition, in colors, of the chart of Lake Erie on the Mercator projection, prepared by the Hydrographic Office, Bureau of Equipment, U. S. Navy, has been printed by and is for sale at the United States Lake Survey Office, Detroit, Mich.

WAGES OF PLATERS IN THE SHIP BUILDING INDUSTRY.

The report of Ernest F. G. Hatch, British commissioner appointed to inquire into the application of the "particular" section of the factory and workshop act, recently filed a report covering the platers employed in the ship building industry. His remarks are appended:

The system on which almost all the skilled workmen in ship building yards are paid is by the piece, and for some kinds of piece work, which are comparatively uniform in character, e. g., riveting and caulking, price lists showing the nature of the work and the rates payable have been arranged between the employers and the workmen. In such instances, therefore, no grievance arises, but for the "platers" no such price lists have been agreed upon. The work they have to do is to piece together the steel plates of which the sides and decks of ships are composed, and they complain that, at the commencement of a job, they never know the rate at which they are to be paid, and frequently, since in most firms it is not the practice to give details in the paynotes, are unable, even when they receive their pay, to tell how their wages have been calculated.

It is a common practice to fix the price to be paid as the work proceeds; for this purpose a rough system of bargaining is adopted between the workmen and the employer, and consequently it often occurs that the price is not settled for a week or more; sometimes, even, it is not agreed until the work is completed, and in the meantime "subs" are paid to the workmen on account.

Such a system is certainly unsatisfactory, but Allan Smith, on behalf of the employers, explained that the conditions under which the various jobs of platers' work are done vary so much that it is impossible to arrange any standard list of prices, or in all cases to fix the price of a prticular job before the work is begun. He maintained, in the first place, that owing to ignorance of the circumstances which may have to be taken into account, it is often out of the question to attempt to fix the price before the job is begun; and in the second, that the bargaining between employer and workmen usually takes some time, and the work cannot be delayed until the bargain is completed.

The representatives of the workmen, on the other hand, held that in the majority of instances no such difficulties would arise; but it was admitted that they occasionally might do

so, and, consequently, that no unqualified provision could be justified which would require all prices without exception, to be fixed beforehand. After full discussion, they therefore agreed that it would equally answer their purpose if a statement of the prices paid were given in writing on the completion of the job. Such a statement is, at the present time, given on the paynotes of some firms, and I pointed out to the workmen that if detailed paynotes were made compulsory for all, it would be feasible, by making a collection of them, to obtain a record of prices paid, which would form precedents for the rates to be claimed for future jobs of a similar nature; an absolute requirement that particulars of rates shall in every instance, without exception, be given after the work has been done would be more advantageous to them than any provision for the previous publication of prices merely when it might be possible, since such a qualified provision would be easy to evade. To this view the workmen's representatives assented.

To the proposal that an order should be made on these lines, the assistant secretary of the Employers' Association at first demurred, on the ground that it was superfluous; the books of the firm, in which all particulars were of necessity entered, could, he argued, be consulted by any workman who might wish to do so, and to copy the particulars out would involve much needless clerical labor. In reply to this I pointed out that it would merely be necessary to give the workmen a carbon copy of the entries in the employer's wages book, as was already done by some firms. After further discussion I proposed that in addition to particulars of rates, particulars of work done should also be entered on the paynotes; that these paynotes should be given to the workmen when the final payment for any job is made; and that in any instance when—as sometimes occurs—the men work in a "squad" and their combined wages are received by one of their number, the paynote need only be given to the workman to whom the actual payment is made by the employer.

The present complaint, as above stated, is made only by the platers, but there is no guarantee against the occurrence, in the future, of similar dissatisfaction amongst other classes of workmen. If, for example, for any reason, the existing price lists which are provided for the riveters and caulkers were discontinued, they would be sure to demand that a particulars order should be made for them, and I, therefore, thought it would be well, in the course of my investigation, to consider the advisability of making a general order that should apply to all workpeople employed in the ship building industry. I accordingly discussed with Allan Smith how best to give effect to such a proposal. The cases to be considered are twofold. In the one price lists are provided, and for such operations I cannot see any objection to an order requiring the publication of rates of pay, either by placard posted where the workmen can see it, or by notes given to them when engaged, and when any change in the rates is made. In the other no price list is provided, and then the necessary particulars of rates could be given in the manner already explained, namely, on the paynotes when each job is completed. In both cases the particulars of work done could be notified on the paynotes.

Allan Smith promised to bring my proposals before the Glasgow Ship Builders' and Engineers' Associations, and through these associations to the general federations of ship builders and engineers. I understand the question has now been referred to these bodies, but I have not heard with what result. As, however, more than four months have now elapsed since my negotiations with Mr. Smith, I do not think the matter should be any longer delayed, and I recommend that a draft order applying to persons employed in ship building be issued, to the following effect:

A. Particulars of rates shall be furnished in one of the two following ways:

Either (1) they shall be published by a placard posted in a position where it is easily legible by all persons affected or by a statement handed to each worker when he is engaged and at any subsequent time when the rates are changed.

Or (2) they shall be given on the paynotes when the final payment for the work is made.

B. Such particulars of the work done as affect the amount of wages payable shall be furnished to the worker on the paynotes when the final payment for the work is made.

If wages are paid to one man on behalf of several men, it shall be necessary only to give the particulars required by A (2) and B to the man receiving the wages directly from the employer.

SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS.

Naval Constructor William McEntee and Marley F. Hay have submitted written discussion upon their papers read before the Society of Naval Architects and Marine Engineers, at their last annual meeting. Mr. Hay's paper was upon the "Design of Submarines," and Mr. McEntee's upon "Some Ship Shaped Stream Forms."

Marley F. Hay (Communicated):—Referring to the remarks of Mr. Spear, in which he finds himself unable to agree entirely with my statement that boats of widely divergent qualifications would employ dissimilar tactics, I would amplify my remarks by adding that when a submarine is actually on the scene of conflict her tactics must necessarily follow certain lines, which will differ for different types inasmuch only as their capabilities submerged differ, but the point the writer had in mind was that a difference between 16 knots surface speed and 11 knots might constitute the ability and inability respectively to accompany a fleet, and therefore the statement would have been less liable to misinterpretation if it had been worded that "the opportunities arising in a naval war with vessels having such widely divergent qualifications must be dissimilar."

Naturally it might be inferred *a priori* that vessels of only 11 knots surface speed would in any case be too small to accompany a fleet on the sea and *vice versa*, but, as a matter of fact, at the present time speed and displacement are not as relative as might be supposed.

It is undoubtedly true that exceptionally high surface speed is obtained at the sacrifice of some submerged speed and endurance, but it is equally true that, with a given displacement and power on the surface and submerged, a higher surface speed can be obtained with a modified ship form than is possible with a modified spindle form and that, moreover, with no sacrifice of either submerged speed or endurance.

In regard to Mr. Chace's discussion I would point out that "double hull" and "single hull" were not intended as accurate designations for clearly defined types, but as a division of the most general description, analogous to bromides and sulphides of another realm. As a notable example of complete double hull, however, the Krupp boat may be mentioned.

I cannot quite agree with Mr. Chace's deduction that if the boat cannot be built to withstand the maximum possible depth in her field of probable operation, no effort whatever should be made to provide strength beyond the amount necessary for a submergence of 150 ft. It seems to me that, where depths are such that vessels cannot be built of sufficient strength to withstand crushing, more attention rather than less should be paid to constructional strength for the rea-

sons stated by Mr. Spear in his discussion, namely, that strength was imperative in case of involuntary sinking, in which event the maximum amount of strength possible is desirable in order to provide time for the crew to take corrective measures and bring the vessel to the surface.

Referring to the "60 per cent" reserve buoyancy of the Laurenti type, of which Mr. Chace requests an explanation, I would say that, generally speaking, a large percentage of reserve buoyancy in light condition is regarded as a desirable asset and, in view of that fact, Laurenti have devised an ingenious method of calculating the reserve buoyancy which makes the impressive figure of 60 per cent technically correct.

Some years ago the term "reserve buoyancy" indicated the absolute difference between the weight of the vessel with ballast tanks empty and the submerged displacement—in other words, the amount of weight necessary to take on board to cause the vessel to sink. At that time a non-water-tight superstructure was usually fitted to provide deck space and cover various fittings which were stowed therein. Later, it became the practice to increase the amount of surface buoyancy by the simple expedient of fitting water-tight scuppers in the superstructure, which prevented the ingress of water when the vessel was in the light condition.

By simply opening these scuppers before trimming, the superstructure became non-water-tight and filled as the vessel sank.

It will be recognized that the absolute buoyancy, which may be called "primary buoyancy," is limited by restrictions of weight and usually lies between 12 per cent and 20 per cent of the total submerged displacement.

On the other hand, the buoyancy of the superstructure, which may be termed "secondary buoyancy" and may be made large or small at will within any reasonable limits, bears no relation to either weights or displacement. For this reason alone it should not simply be added to the "primary buoyancy" and all considered as total buoyancy. This, in effect, is what is done by Laurenti.

They assume that the vessel in the light condition has a weight and a displacement of 185 tons. The water-ballast tanks are capable of containing 50 tons, which gives a "primary buoyancy" of 50/235 = 21.3 per cent.

The superstructure in the light condition is capable of excluding 91 tons of water when the valves or scuppers are closed. Therefore, according to Laurenti, the total buoyancy in the light condition is 21.3 per cent + 38.7 per cent = 60 per cent.

Exactly the same actual arrangement is in use by other constructors, in which only the "primary buoyancy" is considered as reserve buoyancy.

Regarding the limit of speed submerged as determined by J. G. Johnstone, it is true that we are still far from even approaching the absolute theoretical limit, but I am convinced that, in practical operation, the practical limit will also be reached long before the theoretical maximum is approached.

Replying to Mr. Baker's statements, it is undoubtedly a point of fact that "even-keel" submarines have been successfully submerged repeatedly on the "even-keel" principle, but the author wished to point out that this is usually accomplished with a change of longitudinal trim and always accomplished by a tendency to change longitudinal trim without either being disadvantageous or dangerous.

Showing that in single-hull vessels, capable of relatively deep submergence, a drop keel might not be considered a necessity, was not promulgating a personal opinion, but expressing the cause, which may have been responsible for the effect. There seems, as a matter of fact—especially where a certain amount of ballast must in any case be installed, either to compensate for calculation and weight inaccuracies, or for stability considerations—to be no valid reason for not fitting a drop keel.

Some Ship Shaped Stream Forms.

Assistant Naval Constructor William McEntee, U. S. N., Member (Communicated):—Captain Hovgaard's remarks, in which he shows that the main conclusions reached in the paper are in general accordance with the results obtained by him from an exhaustive analysis of the resistance curves of numerous ships of various characteristics, are gratifying and of much interest. It sometimes happens that theories based on mathematical reasoning alone do not fit the facts, and they are apt to be rejected with a brief "so much the worse for the theory." Any reasonable theory which agrees with observed facts is more likely to receive careful consideration.

Answering the query as to the water-line coefficient in Fig. 6, which would cause the least wave-making disturbance; it would be about 0.60 under the conditions discussed. As stated in the body of the paper, for an actual ship with water free to move in three dimensions the depressions amidships would be much less than those given in Fig. 6. Assuming that they would be one quarter of those shown the best water-line coefficient would be about 0.55. This agrees remarkably well with the results of Captain Hovgaard's analysis.

I believe that many things of importance to naval architects will eventually be pointed out by means of stream-line investigations, and agree with Mr. Taylor in thinking that a less cumbersome means of dealing with them mathematically will probably shortly be available. To give complete ability, however, to deal readily with the complex stream-lines about a propeller will probably require an advance in mathematics almost as great as resulted from the introduction of the calculus.

I had not seen the very interesting papers giving the results of Herr Ahlbom's work with stream lines at the time Prof. Sadler referred to them and wish to thank him for doing so.

In conclusion, though the point was not brought up in the discussion, it is proper to point out that the results of the paper are strictly confined to wave-making disturbance as affected by the shape and fineness of water lines. In those types of vessels in which the surface friction is the principal part of the whole, it may easily happen that comparatively full or straight lines may give a less total resistance per ton of displacement than fine, hollow lines and therefore be more desirable.

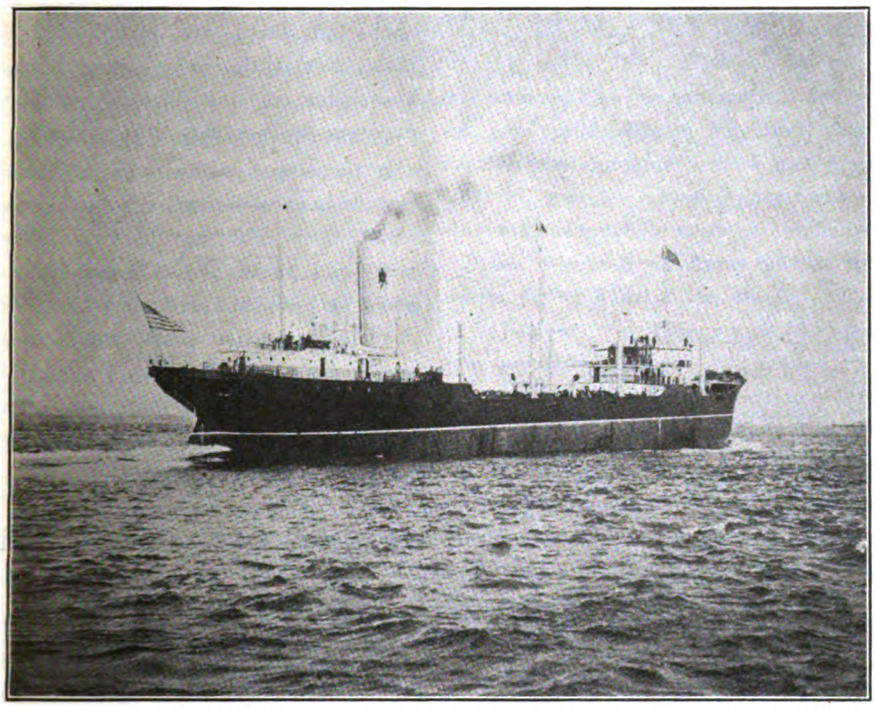
STAR IDENTIFICATION TABLES.

H. O. Publication No. 127, "Star Identification Tables," is now ready for issue. To relieve navigators of the difficulty of recognizing stars, and to provide for a wider use of stellar observations in navigation, the United States Hydrographic office has published a convenient "Star Identification Table," by means of which the observer is made independent of any previous knowledge of the name of the star he observes and, instead of being confined to the employment in his observations of those stars which he may be able to recognize, is enabled to identify any star that is bright enough to observe, from the data used in his observations together with the star's approximate true bearing. Price 75 cents.

The steamer which the Union Iron Works, of San Francisco, is building for the Monticello Steamship Co., is designed especially to meet the growing business between San Francisco and Vallejo, Cal. The craft is to be 333 ft. long over all, 49 ft. beam over guards and 6 ft. deep, with a draught of 9 ft. 6 in.

TRIAL TRIP OF HERMAN FRASCH.

The Herman Frasch, built by the Fore River Ship Building Co., Quincy, Mass., for the Union Sulphur Co. of New York, underwent her trial trip on March 19, developing a speed of 12¼ knots in light ballast trim. The contract requirements were for 12 knots light and 10½ knots loaded.



TRIAL TRIP OF STEAMER HERMAN FRASCH.

CAR FERRY ANN ARBOR NO. 1 BURNED.

Car ferry Ann Arbor No. 1 was burned at Manitowoc, Wis., at 5 p. m. March 8 with a cargo of 22 loaded cars. The fire started forward and spread rapidly, completely destroying the ferry. The car ferry was built in 1892 at Toledo for the Ann Arbor railway, and was 260 ft. long, 53 ft. beam and 15 ft. deep.

COMBINED DOCK AND ORE FLOOR OF REINFORCED CONCRETE.

Following is a brief description of the Detroit Iron & Steel Co.'s combined re-inforced concrete dock and ore floor on Big Island. It is supported upon wood piling, being designed to obtain lightness and durability without sacrifice of strength. The dock was designed to meet local conditions, bringing into use property that otherwise could only have been improved at considerable expense.

The dock proper is 28 ft. wide by 200 ft. long, resting on two double rows of oak piling from 40 to 45 ft. long, driven to refusal. The concrete girders supporting the dock are carried well down below mean low water level. An expansion joint is provided every 50 ft.

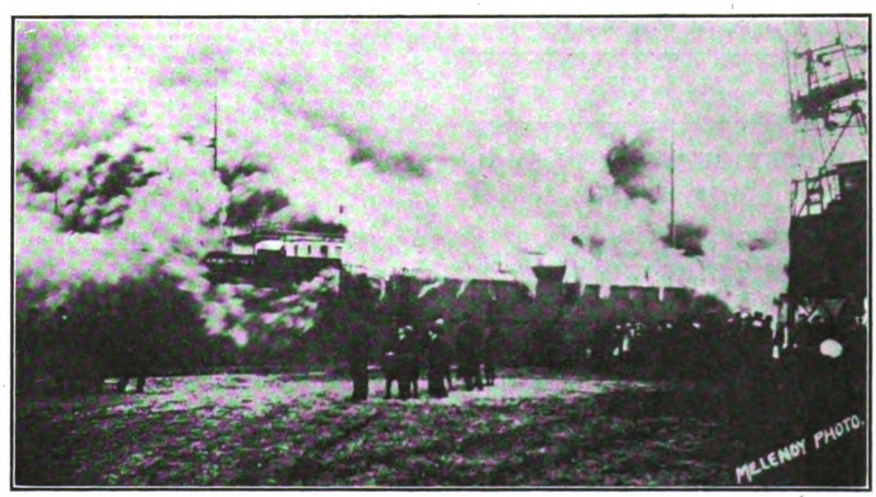
The ore floor is directly back of, and really a part of, the dock, being tied to it—the whole forming a continuous monolithic structure and maintaining perfect alignment of ore bridge towers, thereby insuring maximum efficiency of the machine at all times, a service that is often exacted.

The ore floor was built over low marshy ground covered at times with from six to twelve inches of water, and extends 173 ft. from the center line of the inner girder of the dock proper to the center line of the inland girder. This girder supports the rear tower of the ore bridge. The ore floor consists of a 12-in. slab resting directly upon 12-in. piling 35 ft. long, spaced 4 ft. center to center, both ways. No allowance has been made for the earth under the floor taking any load whatever, the entire weight amounting to about 6,800 lbs. per sq. ft., being carried by the piling. The top of the ore floor is dropped 4 ft. below the top of the girders, thus increasing the capacity about 7,400 tons, the total capacity being approximately 245 tons per lineal foot of floor, which is 200 ft. long.

The dock was designed and built by The Carey Construction Co., of Cleveland, Ohio, under the supervision of Arthur G. McKee, the well-known furnace engineer.

THE STERN FRAME OF THE WHITE STAR LEVIATHAN, OLYMPIC.

The largest ship's stern frame yet manufactured has just recently left the works of the Darlington Forge Co. It is for the great White Star liner Olympic, which Messrs. Harland & Wolff are building at Belfast. The weight of the stern frame casting alone is over 70 tons, and for the purpose of transport it had to be made in two pieces. The shaft brackets supporting the after propellers weigh about 75 tons, and those for the forward propellers 50 tons. The upper part of the stern frame is 63 ft. high and 22 ft. wide.



THE BURNING CAR FERRY ANN ARBOR NO. 1.

The Seaford Marine Railway Co., Seaford, Del., is grading for additional building slips.

THE MARINE REVIEW

DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED OR ASSOCIATED WITH MARINE MATTERS ON THE FACE OF THE EARTH.

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April, 1910.

THE COST OF WORK IN SMALL SHIP YARDS.

A prominent shipping firm on the Pacific coast recently called for bids for the construction of a number of flat bottom wooden barges suitable for carrying coal, rock, or similar cargo in smooth water. When the bids were opened they were found to vary over 100 per cent in their most important elements, price and time required. There were no unusual features in the design of construction of the barges and nothing extraordinary in the specifications. The work required was simply to build and deliver completed at a specified point several ordinary heavy wooden scows, each about 120 ft. in length and 40 ft. beam. The tabulated bids on this work appear as follows:

No.	Amount.	Delivery, days
1	$25,200	90
2	25,000	180
3	27,000	120
4	42,000	120
5	32,000	120
6	42,000	120
7	44,000	112
8	51,500	120

The discrepancy, it will be noted, is wide both as regards the sums involved and the time required, and yet the varying figures shown in this schedule are not at all unusual in bids for marine work on the west coast.

The condition disclosed by the above list which we wish to emphasize is not unique but was selected from several merely as an example, and is not at all complimentary to the ordinary ship builder.

There were no extenuating circumstances in the case under consideration. The prices of lumber, iron, and other materials were well known and the same to all; labor conditions and costs were practically identical in each case. The work to do was commonplace; thousands of similar barges have been built in all parts of the country. And yet on this job, hardly complex enough to interest the kindergarten class in ship building, we find that eight experienced builders, including some companies with assets of over $1,000,000, cannot agree within 100 per cent either on the price or the time required to do the work.

Evidently there is a screw loose somewhere. In spite of all the educational work that has been done during the past 50 years by the technical press, the engineering societies and universities, in spite of the fund of data that has been compiled on the cost of doing work, and the improvements that have been made in cost accounting, it is evident that an accurate knowledge of costs is wanting among a large proportion of those engaged in the class of work covered by these bids.

There are many properly organized institutions located on both coasts and the great lakes that do know what their work costs; but the great majority of men, who individually or through small corporations build small vessels on contract, do not. If they did, such a schedule as that quoted above would be impossible. These men may be good mechanics, able to build staunch, well modeled vessels—we happen to know that they are such—but there are many of them that have little more than a hazy knowledge of the factors going to make up an accurate cost account.

If the actual inside financial history and "cost accounting" of the average small boat builders that fail every year—and there are a good many—could be published and placed into the hands of the survivors, much good would be accomplished. To do this is manifestly impossible, but some work along these lines would be feasible and desirable.

TRANSPORTING GOVERNMENT SUPPLIES IN AMERICAN SHIPS.

There are now two resolutions before congress having in mind the accomplishment of the same end but with this striking difference—one of them is vulnerable and the other is invulnerable. The Frye senate resolution is the weak one, the Hayes house resolution is the strong one. The Frye resolution reads:

That Section 1 of the act approved Feb. 17, 1898, entitled "An Act to Amend the Laws Relating to Navigation" hereafter shall extend to merchandise transported for the government of the United States and property owned by the government of the United States.

Section 2. That in any contract hereafter made transportation by sea of material and equipment from the United States for use in the construction of the Panama canal shall be restricted to vessels owned by the United States or by the Panama Railroad Co., or to vessels of the United States chartered by the United States or by the Panama Railroad Co., or to vessels of the United States tended by the lowest responsible bidder, if any be tendered, unless the president shall in any case deem such bids or tenders to be extortionate or unreasonable.

The Hayes resolution reads:

That hereafter the transportation by sea of (a) materials, stores and equipment for the use of the army or navy of the United States; of (b) the forces of the United States; of (c) materials, stores and equipment from the United States for use in the construction of the Panama canal and (d) of all material and equipment for use in construction or maintenance of fortifications, harbors, navy yards, naval stations or other works for account of the United States, shall be restricted to vessels of the United States, and no others, and such transportation, when time will permit, shall be furnished by contract, after proper advertisement, by the lowest bidder complying with the requirements of the United States.

Everyone who desires to conserve

the transportation of government supplies in American ships should urge the passage of the Hayes resolution.

The trouble with the Frye resolution is that, if adopted, it will accomplish nothing. In its construction it is a perfect sieve. It lacks definition. Experience has shown that the government requires but slight provocation to read into congressional enactments any meaning that serves its end, as witness Bonaparte's interpretation of the coastwise laws in relation to the transportation of naval coal to the Pacific coast. The Frye resolution in no way amends existing conditions. It is not mandatory.

On the other hand, the language of the Hayes resolution is unequivocal. It makes it impossible to send government supplies of any character to the Panama canal zone, to the Philippines, Porto Rico or to any American port in other than an American bottom. It does not include the transportation of general commercial supplies between the United States and the Philippines which are left free to go in foreign ships as now, but it does provide an entering wedge into our trade with these outlying possessions, for if American vessels are retained to carry government supplies they would in the natural order of things carry private supplies as well, if any offered, and would gradually enter into commercial relations with the islands —in other words, gradually eliminating the reason for the exclusion of our outlying possessions from the coasting laws.

The Hayes resolution will extend our trade to the Philippines in an entirely natural manner. Statistics are not available as to the actual amount of government supplies now being transported to the Philippines, but it must be considerable. If these supplies are transported in American ships, general trade will naturally follow in the same ships. This should be clear to anyone. Regarding the transportation of supplies to Panama for use in the construction of the canal, equity demands their reservation to American bottoms. This trade rightfully belongs to the American ship, for the canal is purely an American enterprise. If reserved to the American ship there will be plenty of tonnage offering under competitive bidding. Certainly the government has no right to expect any treatment other than that which is accorded to its own citizens. If the rates submitted are the going rates of ordinary commercial practice paid out without a murmur by every American shipper for the transportation of his own goods, the government has no right to exact or even to expect a more favored rate. There should be one law for the citizens and for the government.

It is a delusion to think that money is being saved by the transportation of supplies to the Panama canal zone in foreign ships. Take the Pacific coast lumber trade with Panama, for instance. Practically the only thing that the Pacific coast contributes to the construction of the canal is lumber. Under the government's regulations all requests for tenders provide for f. o. b. prices Panama. Thus the contractors are required to purchase the supplies and assume transportation to the canal zone. When construction first began on the canal, American firms supplied large quantities of lumber, transporting it in American-owned tonnage, some of which had been especially constructed for the Panama lumber trade. The usual rate of freight was about $12 per 1,000 ft. b. m., barring no length, from Puget sound to Panama. Ultimately foreign vessel owners began competing, their vessels reducing the rate to about $7.50 per 1,000 ft. b. m. The American vessels, a number of which as stated had been constructed especially for this trade, were compelled to withdraw and enter the coasting trade, demoralizing it by an over-supply. After the American vessels withdrew, the foreign vessels gradually increased rates until at present $11 per 1,000 ft. b. m. up to 40-ft. lengths is charged, after which the rate increases until $25 per 1,000 ft. b. m. obtains for 60-ft. lengths. The whole Pacific coast lumber trade is now controlled by W. R. Grace & Co., whose principal offices are in London. Obviously the government is paying a fancy price for the transportation of lumber to the Panama canal zone.

The reservation of the Panama canal trade to American ships would have collateral advantages. During 1908 the coal trade to the Panama canal zone, Tampico and Vera Cruz from Philadelphia, Baltimore and Hampton Roads was 617,000 tons. The average cargo was 4,500 tons, so altogether 150 cargoes were forwarded, at an average cost of $1.10 per ton. These ships obtain a return cargo of Cuban ore which is delivered to Philadelphia and Baltimore at 85 cents a ton. The ships are enabled to carry this ore so cheaply owing to the unfailing southbound cargo of coal. The round trip consumes one month. All the ships employed in this trade are foreign ships. It takes twelve ships operating steadily year in and year out to care for this trade. Were the supplies to the zone confined to American ships, these self-same American ships would quickly monopolize the south-bound coal and north-bound ore trade. Add to this the coal trade to the Pacific which amounts to $175,000, and a very respectable trade is in sight. It is certainly safe to say that the passage of the Hayes resolution would assure the American ships immediately of an annual freight tonnage of 1,500,000 tons. With that trade as an entering wedge, haven't we the right to expect that more would follow? Does it not afford a natural opportunity for the rehabilitation of our declining merchant marine?

MERCHANT MARINE LEAGUE INVESTIGATION.

The investigation of the activities of the friends and supporters of an American merchant marine and of the Merchant Marine League in particular, at the hands of the committee appointed at the instance of Congressman Steenerson, of Minnesota, and Kusterman, of Wisconsin, while not so designed by its sponsors, can result only in good to the movement for the upbuilding of the American merchant marine. The Merchant Marine League has nothing to conceal; it freely admits its sole purpose to

be the securing of legislation looking to the upbuilding of American shipping by any and all lawful means and leaving no stone unturned to that end. Both Steenerson and Kusterman have opposed this movement, and in a letter to a gentleman in Minnesota, who inquired his reasons for doing so, Mr. Steenerson made a statement to the following effect:

> Of course you understand that the Merchant Marine League is an organization of interested parties who expect to get big contracts and make money at ship building and other enterprises stimulated by the proposed subsidy and that their patriotism and love for the flag is largely, if not wholly, due to the appropriations involved.

A statement such as this the League could not let pass unchallenged, and in its bulletin, *The American Flag,* the statement was branded as an untruth. It has been time and again pointed out that not only has no ship builder or ship owner contributed a dollar to the funds of the League, but that voluntary contributions from any source that could be benefited directly by shipping legislation have been returned. The League's records are open and will bear out this assertion. There is not a ship builder, ship owner or agent among the League's officers. If the investigation is impartially carried out on broad lines it can only emphasize this fact. Steenerson's statement is absolutely without the slightest foundation.

Kusterman, in a long speech in the House, on Jan. 8, quoted a large number of persons prominent in shipping circles as opposed to the Humphrey bill or, in fact, to any national action in support of American shipping. THE MARINE REVIEW is in a position to say that when the testimony is all in all the statements of these gentlemen will wear a somewhat different aspect. Other persons are totally misrepresented by garbled extracts from letters and speeches and the entire array is a manifest attempt to mislead the House. These facts will doubtless be brought out in due time, but meanwhile the actions of Steenerson and Kusterman make one wonder what sort of American citizens they are. Apparently they desire to pose as martyrs and patriots before their constituents in the coming congressional elections.

YACHT ALOHA.

The yacht Aloha is an auxiliary steel steam vessel, constructed under the special supervision and to the highest class in Lloyd's Yacht Register. She is rigged as three-masted barque and will spread about 19,000 sq. ft. of canvas. The yacht is of the following dimensions: Length on deck, 202 ft.; length on load water line, 165 ft. 10 in.; extreme beam, 35 ft. 6 in.; depth molded, 22 ft. 4 in.; extreme draught, 16 ft.

The Aloha has a clipper stem with a graceful trailboard carving terminating in a full size figure head. The stern is of the usual arch board type customary in American yachts. The main deck is flush amidships, terminating forward and aft in a monkey forecastle and raised quarter deck, respectively. The machinery is arranged amidships, having engine room staff quarters suitably located around machinery spaces, the crew being berthed in a commodious forecastle, and the owners and guest state rooms occupy the after part of the yacht. Composite deck houses of steel and teak are built on the main deck, enclosing entrance stairways and deck saloons. The owner's, guests' and the various saloons have been finished in a highly artistic manner and tastefully furnished.

The machinery consists of a set of triple-expansion, direct-acting engines, furnished with steam by water tube boilers, the whole installation providing power of about 500 H. P., operating a manganese bronze feathering propeller. The smoke stack is telescopic to provide for being housed out of the way when the yacht is under canvas.

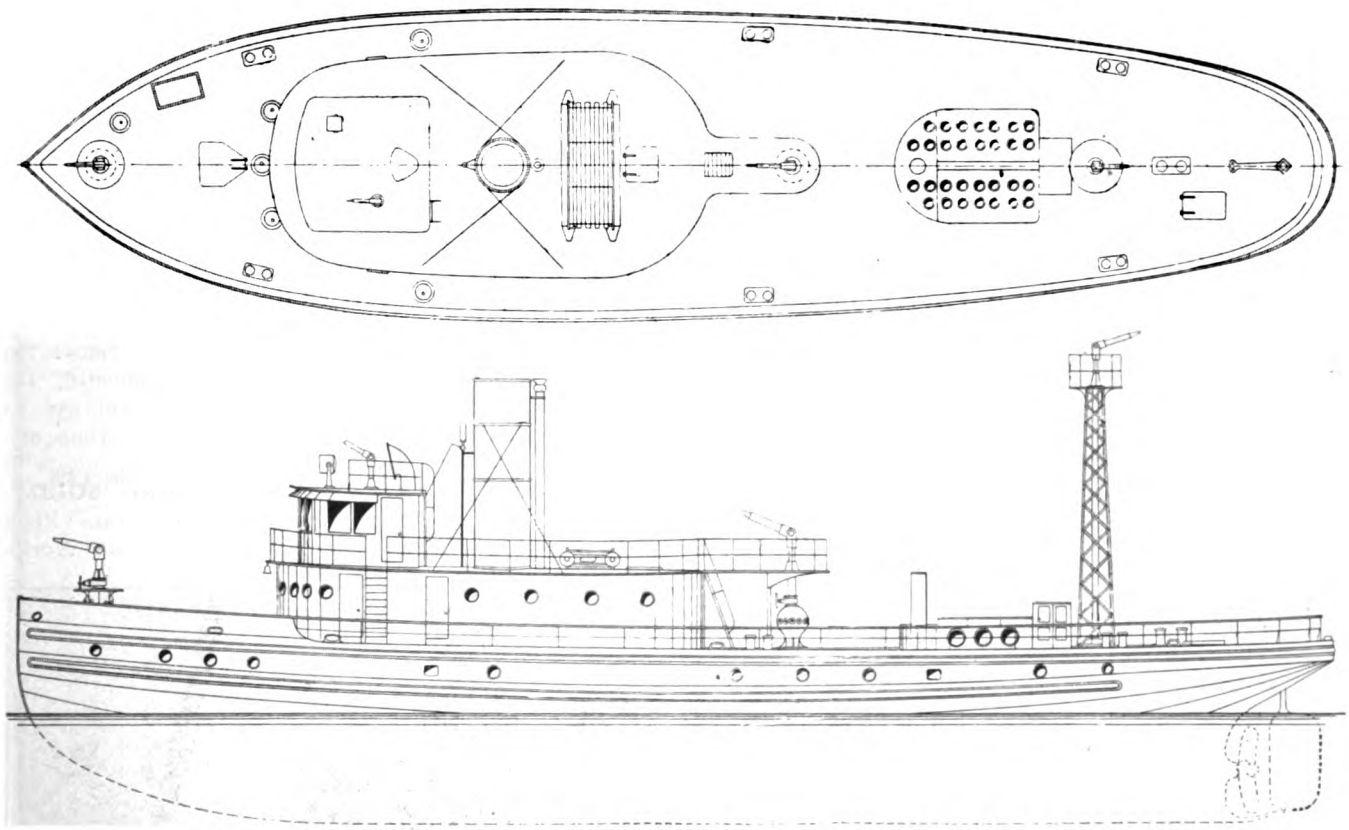
Altogether the yacht Aloha is one of the largest and handsomest auxiliary steam yachts afloat and will prove to be a valuable addition to the cruising fleet of the New York squadron whose flagship she will be.

YACHT ALOHA.

A COMBINATION OF PARSONS AND CURTIS TURBINES.

An interesting engineering development is the combination of Curtis and Parsons turbines it is proposed to fit in the four 32-knot destroyers which Messrs. Cammell Laird & Co., Birkenhead, Liverpool, are to build for the Argentine government. Steam will be generated on these destroyers by White-Forster water tube boilers. It seems peculiarly fitting that the famous Mersey firm, after their great success with the 36-knot destroyer Swift (fitted with Parsons turbines), at present the fastest vessel in the British navy, should be selected as the builders of the Argentine destroyers in which a combination of the Curtis and Parsons turbines will be fitted for the first time.

Merton L. White was recently appointed general agent of the Western Transit Co., with headquarters at 47 Main street, Buffalo, N. Y.



OUTBOARD PROFILE AND DECK PLAN OF THE NEW FIREBOAT FOR THE CITY OF BALTIMORE.

For description see page 145.

LAKE SEASON OF 1910.

Navigation on the great lakes will open on Saturday next. The leading shippers have arranged to have their fleets leave port as soon as insurance begins, which will be at midnight Friday. Some of the vessels of the Pittsburg Steamship Co., which operated without insurance, will leave port earlier, arrangements having been made to open the Canadian lock on April 12. Nearly all the up-bound carriers will carry coal on their first trip. Ore loading has begun at upper lake ports, the steamer J. J. Sullivan being the first to take on a cargo. She left Duluth for Ashland and loaded on Monday, April 11.

There has been no chartering in the ore trade for several weeks, but the coal rate to Lake Michigan was advanced 5 cents over last year's charges on April 8, and chartering has been quite free in that trade since. The vessels will receive 35 cents to the fast docks on Lake Michigan and 40 cents to the slow docks at Milwaukee. The rate of 30 cents to Lake Superior was established at the beginning of the year.

The underwriters have established the hull insurance rate at 6 per cent, which is an advance of 1 per cent over last season. The underwriters have agreed, however, to refund 10 per cent of the earned or net premiums to all vessels that operate throughout the year free of damage claims. One-fourth of this refund is to go to the captain of the boat as a bonus. Under the new plan the refund on a steamer insured for $340,000 would be $1,744, of which the captain would receive $436. The paying of these bonuses to the captain is to be left to the discretion of the Advisory Committee of the Great Lakes Protective Association for the following reasons: A captain might take his vessel through a season without damaging his boat to such an extent that the underwriters would be called upon to settle for it. On the other hand, he might have a number of damages of less than $500 each which, under the deductable average clause, the owner will have to pay. Thus while the vessel would get the refund from the insurance company, the damage done under deductable average during the season might be so great as to totally extinguish the rebate. Under those conditions the boat would not gain anything under the refund and the owner might not feel like paying the bonus.

Naturally, however, owners are hoping that there may be no deductable average claims and that they may be free to award this very considerable bonus to their masters. It must be understood that this bonus would be in addition to the one that is now customarily paid by the leading companies to their masters who bring their vessels through a season without injury.

The protection and indemnity rate which last season was one-half of 1 per cent, has been advanced to five-eighths of 1 per cent, while the deductable average remains at $500. The season for insurance will close at midnight Nov. 30 as against Dec. 5 of the former policy. It is probable also that the practice of extending the period of insurance under an excess rate will be abandoned. The cargo insurance rate on ore and coal will be the published rates of last season without discount. This means an advance as the published rates in 1909 were shaded a bit.

MARCH LAKE LEVELS.

The United States Lake Survey reports the stages of the Great Lakes for the month of March, 1910, as follows:

Lakes.	Ft. above tide-water, New York.
Superior	601.54
Michigan-Huron	580.00
Erie	571.68
Ontario	245.75

Lake Superior is 0.19 foot lower than last month, 0.19 foot higher than a year ago, 0.45 foot below the average stage of March of the last ten years, 0.74 foot below the high stage of

March, 1901, and 0.53 foot above the low stage of March, 1892. It will probably remain about stationary in April.

Lakes Michigan-Huron are 0.04 foot higher than last month, 0.06 foot lower than a year ago, 0.15 foot below the average stage of March of the last ten years, 2.95 feet below the high stage of March, 1886, and 0.89 foot above the low stage of March, 1896. They will probably rise about 0.4 foot in April.

Lake Erie is 0.49 foot higher than last month, 0.10 foot lower than a year ago, 0.11 foot above the average stage of March of the last ten years, 2.17 feet below the high stage of March, 1887, and 0.85 foot above the low stage of March, 1896. It will probably rise about 0.8 foot in April.

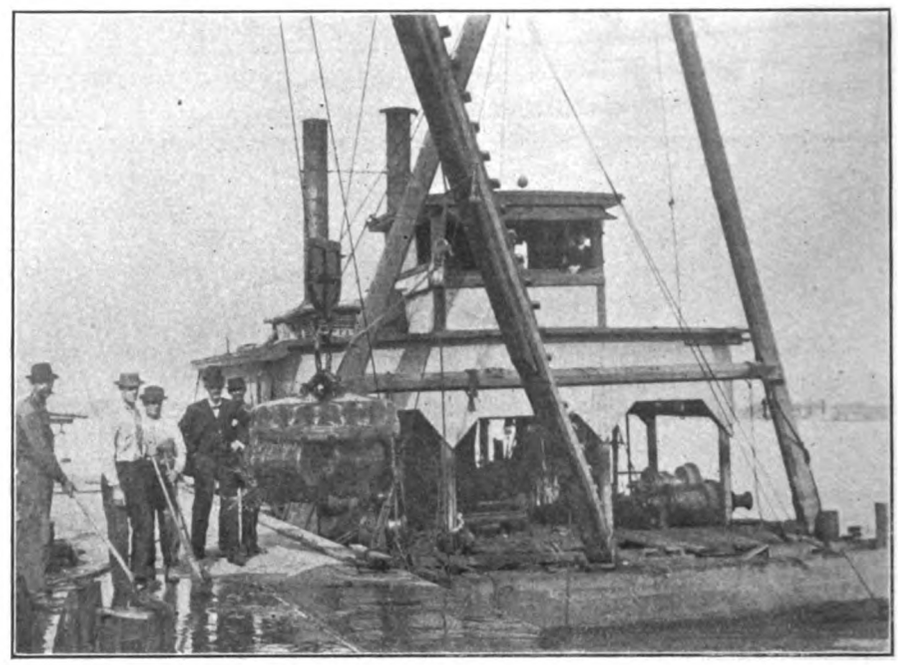
Lake Ontario is 0.72 foot higher than last month, 0.05 foot higher than a year ago, 0.32 foot higher than the average stage of March of the last ten years, 2.06 feet below the high stage of March, 1886, and 1.45 feet above the low stage of March, 1897. It will probably rise about 0.9 foot in April.

THE LIFTING MAGNET IN WRECKING AND SALVAGE OPERATIONS.

Another useful application of the lifting magnet has been found in recovering submerged material. It is now being used to raise steel cargoes from vessels sunk in the Mississippi river. The present experiment is being made near New Orleans, where a barge load of kegged nails is being raised. A load of cotton ties, sunk near Natchez, will be next taken up, while a load of woven wire, sunk near Pittsburg, will be the third task. All are the property of the United States Steel Corporation. The magnet used in the work is 3½ feet in diameter, and weighs 3,000 pounds. It is dropped into the stream, the current turned on, and five or six kegs of nails raised to the lift. A derrick is employed for the purpose. The nails weigh 200 pounds to the keg, so the magnet lifts from 1,000 to 1,200 pounds each operation. A great saving is being realized by the use of the magnet, which could not be otherwise effected. Were a dredge used, kegs would be broken open, and much valuable material lost. In this way, the kegs are raised intact, and the nails are uninjured, except for slight rust. Between 85 and 95 per cent of the cargo can be raised. It is valued at $45 per ton. The kegs are raised from a depth of 70 feet. Much thought has been given to the problem of thoroughly waterproofing the lifting magnet as pointed out in the very complete article on "The Lifting Magnet as an Industrial Factor" in *The Iron Trade Review,* Jan. 6, 1910, and the foregoing examples are evidence of the thoroughness with which this is accomplished in existing types.

Instances are frequent where magnetic material, either loose or boxed or crated, is submerged so as to be easily reached by a magnet though possibly at depths too great for a diver, even if the value of the salved material were high enough to justify his employment. In many other instances the combination of the two might make profitable operations which would otherwise not be undertaken, especially as the modern wrecking steamer requires the addition of nothing whatever in the way of equipment except the magnet itself to make its use possible.

The magnet used in the operations referred to above was made by the Cutler-Hammer Mfg. Co., Milwaukee.



THE LIFTING MAGNET SALVING KEGS OF NAILS.

WORK BEGUN ON NEW ORE DOCK.

It is announced from Superior that the Soo line has begun preliminary work looking to the construction of an ore dock at that port for the purpose of handling the output of the Cayuna range, which, it is expected, will begin shipping some time next summer. The dock is to be located on St. Louis bay, near the Billings Park Cast Iron Pipe Foundry. It will be built of timber, and it is thought can be ready to handle the ore some time during the latter half of the season. Whitney Bros., contractors of Superior, have the work in hand, and have begun by driving piles in order to determine the nature of the bottom. The dock will be a small affair at first, because it is expected that not more than one mine will be in the shipping list this year. If it should be desired to ship before the dock at Superior is completed, the Soo line, it is expected, will use its dock at Ashland for the Cayuna ore.

ROACH'S SHIP YARD SOLD.

The plant of the Delaware River Iron Ship Building & Engine Works, Chester, Pa., which was known for years as Roach's ship yards, was sold at receiver's sale recently. The purchaser was William H. Hanford, acting for William Holman, of New York. The price paid was $153,210, subject to a mortgage of $100,000.

SAND SUCKER FOR CHICAGO.

The Manitowoc Dry Dock Co., Manitowoc, Wis., is building a sand sucker for the Lake Sand Co., of Chicago, 164 ft. long over all, 156 ft. keel, 35 ft. beam and 10 ft. deep. She will carry 600 ft. of sand in a hopper on deck. The hopper is divided into six compartments, each of which has an emergency freeing port for discharging the sand in case of accident. The hull is divided into seven water-tight compartments with independent water bottom piping to each. The pilot

house is forward and the quarters for the crew, galley and dining room are in the after house which is built flush with the side and end of the hull. The machinery will consist of a 16,-34 by 26 fore and aft compound engine with jet condenser, and a Scotch boiler 11 ft. 6 in. by 13 ft., 150 lb. pressure. The vessel will be lighted by electricity, including arcs for loading and unloading. The sand pumps, of which there are two, are the Morris 12 in. pumps built especially for sand-sucking purposes. They are placed on the after end inside the deck house and the hose is handled by a derrick erected in the roof of the house. All the work done in connection with the pumping is handled in the roof of the deck house, which is kept as clear of obstructions as possible.

DEEP SEA SOUNDING MACHINE.

The deep sea sounding machine described in the February issue of THE MARINE REVIEW and which is being installed on a great number of lake freighters, is the invention of Dobbie, McInnes, Ltd., 57 Bothwell street, Glasgow. This instrument has met with a most favorable reception on the lakes, and it is probable that all of the modern freighters will eventually be equipped with it.

SCHUETTE RECORDING COMPASS.

The Schuette Recording Compass Co., Manitowoc, Wis., has had excellent results with its recording compasses which have been in daily use on the great lakes the past year and a half. These instruments are the only ones in use on the lakes, if not in the entire world, and the company intend to place quite a number of them on ships this spring. The instrument which is specially designed for use on ship board and is so constructed as to produce a continuous record of the direction of a ship with relation to time; so that the direction in which the ship was moving at any hour and minute can be determined at a glance at any time thereafter from an inspection of the records produced.

The instrument shows variations of about 2½° (or a trifle less than a quarter of a point) so that if a ship is on her course and the wheelman lets her go off 2½°, the instrument will immediately register the change of direction, and also the exact time this occurred, so that a captain, by looking over his chart, can tell whether his ship had been working to starboard or to port, and whether his instructions had been followed. The chart will also show the conditions of the weather, as in a seaway the records will be very irregular, while in smooth water a comparatively straight line will be produced.

The size of the instrument is 2 ft. square by 10 in. deep and it can be connected to any ordinary socket, any place on the ship, and any current can be used from 90 to 120 voles; it requires no attention except placing a new chart on the roll every month, and filling the pen about every two weeks.

The clock movement which moves the chart exactly two and one half inches an hour is wound electrically and requires no attention whatever.

One of the special features is the circuit changer, which automatically throws the instrument on a set of batteries if the dynamo current for any reason should give out, and again throws the instrument on the dynamo circuit when the dynamo is again in operation, so that the apparatus is constantly in commission.

The chart will last thirty-one days and the time and date is printed thereon.

The time is graduated to five minute spaces, so that it is an easy matter to ascertain the time to less than a minute at a glance. All points east of north and south are shaded, while all points west of north and south are clear, so the chart can be read with comparative ease.

The binnacle, which goes with the instrument, has all the necessary appliances for affecting perfect compensation or adjustment for heel, quadrantal and semi-circular deviations.

The company will mail an actual chart taken on ship board upon application to anyone interested.

A NEW ENGINE BUILDING CONCERN.

"The Admiralty Power Company" is the name of a new concern which has actively taken up the building of marine gas power plants at Port Richmond, Staten Island, N. Y. Geo. H. Betts is president of the concern, C. Lee Straup, vice president, and Jas. H. Davidson, secretary and treasurer. The firm is composed of members of the Staten Island Ship Building Co. and C. Lee Straub, who was formerly vice president of the Marine Producer Gas Power Co., of New York. The Staten Island Co. has been long prominent in the building of tow boats and lighters and has taken an active interest in the building of marine gas and oil power plants. Mr. Straub is well known in the gas power field and has devoted much time to the development of the marine gas producer. The company has now under construction a 4-cylinder, reversing single-acting engine of 250 i. h. p. at 200 r. p. m., for a small lighter and announce that they are at present equipped to build gas power units up to 1,000 horsepower, and have ample capital to develop the business. It is recognized on all hands that marine gas power is bound to come, and aggressive action, such as the new concern may be expected to take, will hasten its development.

TONAWANDA AS AN INDUSTRIAL SITE.

The Federal Rolling Mill Co., of Lockport, N. Y., have purchased river frontage at North Tonawanda and will erect elevators and a mill upon it. The North Tonawanda board of trade, through its president, William M. Mills, have advanced a most pertinent argument to show the advantage of Tonawanda over Minneapolis and Duluth as a mill site. To begin with, the freight rate on a barrel of flour from the head of the lakes to Buffalo is 30 cents. It takes four bushels of grain to make a barrel of flour. Figuring the freight on grain at 2 cents per bushel from the head of the lake to Buffalo, which is a fair average, it is apparent that there is a saving of 22 cents per barrel, to say nothing of the by-products which, of course, are free. The saving in the freight in the flour alone would be $220 per day on a 1,000-barrel mill, plus the freight on the by-products. Moreover, Tonawanda is located in the heart of the vast consuming population reached by the best shipping facilities.

THE COPPER HANDBOOK, VOL. IX.

The ninth annual edition of the Copper Handbook, edited and published by Horace J. Stevens, Houghton, Mich., is just received. This work, which has become a standard authority on the subject, for the entire globe, has, in its latest edition, 1,628 octavo pages, containing considerably more than a million words, and, in addition to the miscellaneous chapters, lists and describes no less than 7,751 copper mines and copper mining companies, in all parts of the world, descriptions ranging from two or three lines in the case of compan-

ies that have died recently, to sixteen pages in the case of one of the largest mines—a mine, by the way, that employs some seven thousand men, and has paid dividends of considerably more than a hundred million dollars. The mine descriptions are the same as in the preceding volume, except that upwards of eight hundred new titles have been added, covering descriptions not contained in any previous edition. The chapter of statistics, containing upwards of 40 tables, treating of copper from almost every conceivable standpoint, has been fully revised, and brought as nearly as possible to date.

The miscellaneous chapters of the book, 24 in number, treat of the subject of copper from a great variety of viewpoints, including the history, chemistry, mineralogy, metallurgy and uses of the metal, and this section of the book also has chapters devoted to substitutes, alloys, brands and grades, and a copious glossary.

The plan on which the book is sold remains the same as for seven years past, the publisher sending the book by mail, fully prepaid, to any address ordered, without advance payment of any sort, and subject to approval after a week's inspection. The price is $5.00. That this unusually liberal plan has proven successful is showed by the statement of the publisher that net losses through returned copies and defaulted payments are less than 4 per cent.

NEW STEAMERS COMANCHE AND LA TOUCHE.

The Comanche, a steel steamboat, building for the Puget Sound Navigation Co. at the Moran Co.'s yards in Seattle, previously mentioned in THE MARINE REVIEW, will be in shape for launching about June 1. The shipbuilders are making fast progress with this vessel, the keel having been laid and the frames nearly all bent. The joiner work, including doors, windows and other in-door furnishings are also nearly done, and the vessel will be practically completed when she first strikes the water. The machinery is under construction and will be installed before she leaves the ways.

The new cargo steamer for the Alaska Steamship Co., now being built by the Moran Co., Seattle, is to be christened La Touche. La Touche is an island in the southwest part of Prince William Sound, where are located numerous copper mines which are being extensively developed and which are expected to contribute largely to the south-bound cargoes of the new steamer.

PREPARING TO RAISE SUNKEN STEAMER YUCATAN.

From advices received by the Alaska Steamship Co., at Seattle, recently, the steel steamer Yucatan, wrecked in Icy Straits, Alaska, will be floated about April 10. The Santa Cruz, of the Puget Sound Salvage Co., has been at work on the vessel since a couple of weeks after she struck, Feb. 16.

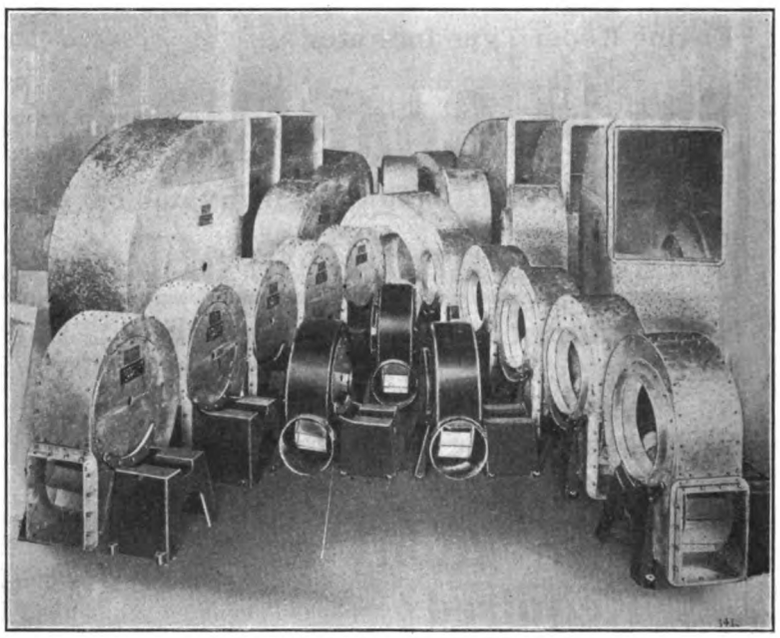
The salvage tug at first was embarrassed by heavy ice blown against the beach. The wind changed recently, carrying the ice to the north side of the straits. Divers were enabled to repair damages and deck over the hull, so the water could be pumped out of the vessel. A test will be made in a few days to see if she is watertight, after which she will be pumped out and floated. She will then be shifted to Gull Bay, a protected place in the vicinity, overhauled and put in shape to come to Seattle for permanent repairs, if possible, under her own steam.

At the scene of the wreck, Capt. Logan, special agent of Lloyds, is acting in an advisory capacity. Capt. T. W. Spencer, marine surveyor, is representing the Alaska Steamship Co., while President J. E. Pharo, of the Puget Sound Salvage Co., is in charge of the salvage forces. Capt. W. P. S. Porter, of the Yucatan, is standing by the wreck and probably will remain there for several days. The question whether the steamship company or the underwriters are salving the wreck is not settled, as the underwriters have thus far refrained from accepting the wreck, abandoned by the owners some weeks ago.

The Yucatan is a steel steamer and was engaged in the package freight and passenger business between Puget Sound and Alaskan ports.

SIROCCO FANS FOR BATTLESHIP UTAH.

The American Blower Co., Detroit, recently shipped 27 Sirocco type H V fons for hull ventilation of the battleship Utah. As will be seen in the illustration they are provided with pedistal, for receiving the General Electric Co's motors. The sizes of the fans were as follows: Three No. 16; 10 No. 26; 8 No. 29, and 6 No. 40. The American Blower Co. is also furnishing 44 fans for the hull ventilation and forced draft equipment of the battleship Florida.



SHIPMENT OF SIROCCO FANS FOR BATTLESHIP UTAH.

NEW LAKE STEAMERS.

The steamer Thomas J. Drummond, now being built for the Algoma Central Steamship Co. by Messrs. McMillan & Son, Dumbarton, Scotland, is expected to reach the lakes in May. She is designed particularly for the rail trade and her principal dimensions are: Length overall, 257 ft.; length between perpendiculars, 247 ft., 9 in., beam 43 ft. 8 in., depth 26 ft. Her power installation will consist of triple-expansion engines 20½, 33 and 54 inch, 36-in. stroke, and two Scotch boilers 14 ft. diameter by 10 ft. 6 in. long, built for a working pressure of 190 lbs.

The bulk freighter which the Collingwood Ship Building Co., Collingwood, Ont., will build for James Playfair, of Midland, will be of the following dimensions: 525 ft. over all,

505 ft. keel, 56 ft. beam and 31 ft. deep, with side tank and arch construction. Her engines will be triple-expansion, 23, 38½ and 63 in. diameter by 42-in. stroke, supplied with steam from two Scotch boilers 15½ ft. diameter and 12 ft. long, allowed 180 lbs. She will be delivered in the fall.

The steamer Riker Island, building for the Department of Correction, New York City, was launched from the shipyard of the Waters-Colver Co., West New Brighton, Staten Island, on April 2. The Riker Island is a wooden vessel throughout, 81 ft. on deck, 75 ft. 10 in. on load line, 20 ft. beam, 8 ft. depth of hold. She will have a draught of 5 ft. and develop a speed of 12 miles an hour. This steamer will be equipped with a flue and return tubular boiler, carrying 150 lbs. pressure per sq. in., a vertical inverted compound surface condensing engine, with cylinders 9 x 20 in. diameter, 16-in. stroke, and to develop 225 H. P.; and will be lighted throughout with electricity.

SHIP BUILDING DURING FEBRUARY.

The bureau of navigation reports 57 sail and steam vessels of 11,663 gross tons were built in the United States and officially numbered, during February, 1910, as follows:

	WOOD. Sail. No.	WOOD. Sail. Gross.	WOOD. Steam. No.	WOOD. Steam. Gross.	STEEL. Steam. No.	STEEL. Steam. Gross.	TOTAL. No.	TOTAL. Gross.
Atlantic and Gulf	4	682	17	910	1	4,015	22	5,607
Porto Rico	1	6	..	...	1	92	2	98
Pacific	..	...	12	475	2	488	14	963
Hawaii	..	...	..	...	..	.....	..	.....
Great Lakes	..	...	10	120	1	4,329	11	4,449
Western Rivers	..	...	8	546	..	.....	8	546
Total	5	688	47	2,051	5	8,924	57	11,663

NEW BRITISH COLUMBIA STEAMER.

A new steamer for the British Columbia coast service is being built on the Clyde for the Boscowitz Steamship, of Victoria, B. C. The vessel is being built by Messrs. Napier & Miller, at old Kilpatrick on the Clyde. The arrangements were negotiated through the agency of Stewart & Esplen, Rumford street, Liverpool.

The plans show that the new steamer is of the awning deck type, built under Lloyds rules to class 100 A1. She will be 180 ft. long B. P., 32 ft. beam and 19.6 depth to awning deck; will carry 500 tons on a mean draught of 11.6 ft., will have twin screws and a guaranteed speed of 12 knots loaded.

The first class accommodations will be contained in a deckhouse on the awning deck. There will be 28 staterooms, each with a double lower and single upper berth, folding lavatory and upholstered settee. The after end of the saloon will contain the ladies' sitting room and will have large lookout windows at the stern; the forward end of the saloon will be used as a social hall and will also have observation windows. The dining saloon will be on the main deck, aft, and will have seating accommodation for 50 people.

The smoking room and bar will be aft on the boat deck and will be reached by a companionway from the main saloon. On this deck will also be the captain's and officers' rooms, and above these will be the chart house, wheelhouse and flying bridge.

The between decks will be fitted with 150 portable berths for steerage passengers so that this space can, when necessary, be used for cargo.

Below the main deck will be the cargo holds, which are two in number, the main forward hold having a large capacity. A unique feature of the afterhold will be that the double bottom tank tops will be level with the top of the tunnels, which are made low for this purpose. By this means an unbroken space for storage of cargo will be available. The ship is built throughout with double bottom and five watertight bulkheads. She will be fitted with latest type of quick cargo hoists, and will have a special derrick for handling lifts up to 15 tons. She will be fitted with electric light throughout and will have a powerful searchlight.

The twin screws will be driven by two sets of triple-expansion engines supplied with steam from two Scotch marine boilers. The boilers will be 12 ft. 3 in. in diameter by 13 ft. length working under 180 lb. pressure. The engines will be piped to a common condenser fitted with Weir's circulating and air pumps.

AMERICAN SHIPS ON THE PACIFIC.

"I believe all who have given the subject thought agree on the necessity of endeavoring to re-create an American merchant marine," said Capt. I. N. Hibberd in an address before the Army and Navy Club at San Francisco.

"Are you aware of conditions of the trans-Pacific trade?" he asked. "There are but five American ships running in this trade, four of which are operating out of San Francisco, and one, and only one, out of Puget sound. These ships would not be able to operate at all were it not for the fact that they are run in connection with the overland railroads and are owned by gentlemen who are able to treat them as yachts and keep the American flag at the peak simply through patriotism.

"I know for an absolute certainty that these owners were approached by the Japanese some time ago and made a very flattering offer, viewed from a financial standpoint. But the reply of one of these gentlemen was: 'I am too good an American to see the flag disappear entirely from the Pacific ocean. If my ships were sold to the Japanese today the other ship would be sold tomorrow, and we would have the spectacle of the greatest ocean in the world without a single American flag in the over-sea trade.'

"I think interests of the shipping industry have been injured by using the word 'subsidy' as applied to any system looking toward its restoration. It gives the impression that the one benefited by it is getting something for nothing, or at least something to which he is not justly entitled. I think we ought to discard it altogether and use the word 'protection' for American ships instead of 'subsidy'."

TREASURY DEPARTMENT, OFFICE OF General Superintendent, U. S. Life-Saving Service, Washington, D. C., March 30, 1910. Sealed proposals will be received at this office until 2 o'clock p. m. of Thursday, the 28th day of April, 1910, and then publicly opened, for furnishing supplies required for use of the Life-Saving Service for the fiscal year ending June 30, 1911; the supplies to be delivered at such points in New York City, Grand Haven, Mich., and San Francisco, Cal., as may be required, and in the quantities named in the specifications. The supplies needed consist of beds, bedding and furniture; brooms and brushes; crockery; hardware; household goods; lamps, lanterns, etc.; medicines, etc.; paints, oils, etc.; ship chandlery; stoves, etc.; tools; and miscellaneous articles; all of which are enumerated in the specifications attached to the form of bid, etc., which may be obtained upon application to this office, or to the Inspector of Life-Saving Stations, 379 Washington street, New York City; Superintendent Twelfth Life-Saving District, Grand Haven, Mich.; and Superintendent Thirteenth Life-Saving District, New Appraisers' Stores, San Francisco, Cal. Envelopes containing proposals should be addressed to the "General Superintendent U. S. Life-Saving Service, Washington, D. C.," and marked on the outside "Proposal for Annual Supplies." The right is reserved to reject any or all bids, and to waive defects, if deemed for the interests of the Government. (Signed) S. I. KIMBALL, General Superintendent.

U. S. ENGINEER OFFICE, JONES building, Detroit, Mich., March 14, 1910. Sealed proposals for furnishing and delivering at St. Marys Falls Canal, Michigan, about 2,630,000 feet B. M. of Timber will be received at this office until 3 P. M., April 14, 1910, and then publicly opened. Information on application. C. McD. Townsend, Col. Engrs.